Exploring Variable-based and Case-based Approaches to Study Multiple Health Behaviours and Motivations of Canadian University Students

A Thesis Submitted to the College of

Graduate Studies and Research

In Partial Fulfillment of the Requirements

For the Degree of Master of Arts

In the Department of Psychology

University of Saskatchewan

Saskatoon

By

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ABSTRACT

Health behaviors tend to occur together. However, the research on what factors define and regulate their coexistence within individuals is still limited. There is also no established methodology to investigate regulation mechanisms of multiple health behaviours. The objectives of the study were to explore: 1) co-occurrence of multiple health behaviours (smoking, alcohol drinking, physical activity, and healthy eating) in a sample of Canadian university students; 2) the role of motivational (e.g., controlled, autonomous and intrinsic motivations), cognitive (e.g., health attitudes and health empowerment), and social contextual (e.g., family and friends) components in these regulation mechanisms; 3) the strengths and limitations of integrating variable-based and case-based methodological approaches to study the coexistence and regulation of multiple health behaviours. The research was based on the theoretical underpinnings of Self-Determination Theory (SDT) and a critical realism paradigm. College students (*N*==238) from the University of Saskatchewan completed a survey in Study 1. Six participants, purposefully selected from the sample were interviewed in Study 2. The most frequent multiple health behaviour cluster was 'alcohol drinking+physical activity+healthy eating' (62%; n=143). The results of multiple regression analysis (Study 1) confirmed that intrinsic and autonomous motivations were the best predictors of the frequency of alcohol consumption, physical activity, and healthy eating. Interview analyses in Study 2 also suggested that multiple health behaviours were best self-regulated when motivations were harmonized with individuals' cognitions and emotions, and supported by their social contexts. Such balance could be achieved by exercising more self-control, making up for one health behaviour via another, or avoiding cognitive dissonance by 'splitting up' a negative concept into positive and negative ones (e.g., occasional smoking to release stress versus harmful chain smoking). Both Study 1 and

Study 2 results present motivation as a hierarchical structure and provide evidence that motivational regulations across multiple health behaviours are interrelated. The comparative analysis of Studies 1 and 2 demonstrates that the integration of two different methodological approaches and the consilience between their results added to the validity and generalizability of the common findings. Importantly, contradictions in findings highlighted limitations of each methodological approach and were discussed in terms of implications for their methodological refinement.

ACKNOWLEDGEMENTS

I would like to thank the people in my life who have inspired me to pursue this journey. I know I would not have made it without the guidance and support of my committee members, faculty, friends, and family.

A sincere thank you to all of my committee members: Dr. Valery Chirkov, Dr. Todd Morrison, and Dr. Ulrich Teucher. I feel extremely fortunate to have such a wonderful committee, and I genuinely appreciate the assistance, vision, and expertise each of you provided.

My deepest gratitude is to Dr. Valery Chirkov who has been both a supervisor and a mentor though my years in school. He has been boosting my confidence when I needed it most, and has been providing me with invaluable feedback from his years of experience. I am truly grateful for all of his honesty and candor about both academic and non-academic issues.

Thank you to Dr. Todd Morrison for his invaluable help in the successful completion of this project. Every time I sought out his advice, I have walked away from the situation feeling more in control and capable. That meant a lot to me, and my dissertation would not be what it is today without him.

I would also like to express my great appreciation to Dr. Ulrich Teucher for all his assistance with my dissertation, as well as his constant support and encouragement throughout my graduate career. He has always been more than willing to share his experience and resources and I have learned valuable lessons from him.

None of this would have been possible without my family. I am grateful for their love, concern, and support through the hard times and stress. To my husband, my daughters and my parents, for believing in me and supporting me, even when I did not believe in myself.

Thank you.

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Aut: Autonomous Motivational Regulation

BPNS: Basic Psychological Needs Support

Cont: Controlled Motivational Regulation

HPs: Health Perceptions

Intr: Intrinsic Motivational Regulation

PHE: Psychological Health Empowerment

PhS: Physical Symptoms

PWB: Psychological Well-being

SC: Social Context

STD: Self-Determination Theory

WHO: World Health Organization

Chapter 1
INTRODUCTION

Heath and behaviour are related in myriad ways, yet those interactions are neither simple nor straightforward. Health behaviors such as physical activity, drinking less alcohol, following a healthy diet, and smoking cessation have been identified as behaviors that may lead to a protective effect from specific or multiple conditions, such as cardiovascular diseases, cancer, type 2 diabetes, and excess weight (Beaglehole, et al., 2011; Spring, Moller, & Coons, 2012; Wells, 2013). Given the wide acknowledgement of these relationships, why do people still smoke, drink in excess, choose a sedentary lifestyle and eat unhealthy?

Previous research suggests that both environmental and psychological factors can affect and regulate individuals' uptake and maintenance of health behaviors (Sallis, 2010). However, most of the existing research has been confined to examining single health behaviors rather than exploring across multiple behaviors. The present study aimed to address this gap and investigate how multiple health behaviours co-occur in young people's lives (Canadian university students) and what psychological mechanisms can regulate their coexistence. In particular, the paper will argue that motivations for all co-occurring behaviours are interrelated (e.g., have systematic relationships within and across health behaviours and form a hierarchy) and that, alongside motivations, cognitive (e.g., self-control), emotional (e.g., incoming emotions) and social contextual (e.g., influence of family and friends) components are important elements of self-regulation mechanisms. As far as I am aware, this has not been attempted elsewhere. Lack of an established methodology to investigate the subject also suggested that integrating different approaches, such as variable-based and case-based, could produce valid explanations, given the assumption that humans live in a single 'consilient' universe in which any two true facts or theories, formerly examined separately, ultimately must be able to fit together (K. M. Sheldon & Schuler,

2015; Wilson, 1998).

Insights into how multiple health behaviours co-occur and can be self-regulated may inform health promotion initiatives and interventions targeting multiple behavioural change. As manipulating and changing an individual's environment are extremely costly (e.g. subsidizing health foods) or unpopular (e.g. increasing alcohol costs), there is considerable interest in the factors that affect individuals' self-regulation, that is, their capacity to make and maintain changes to their behavior in the absence of external prompting, incentive, or reinforcement (De Ridder & De Wit, 2006; Hagger, 2010).

The paper proceeds as follows. The literature review covers previous relevant findings from health and motivational domains, indicates the gaps the current research addresses and outlines its purpose and expected limitations. The next chapter briefly maps out the conceptual framework for the study, summarizes the principles of critical realism paradigm that guide it and presents three research questions to be explored. Following this, the paper shows how the first two research questions were addressed in Study 1 (using a variable-based approach), Study 2 (using a case-based approach), and how the third question about the effectiveness of methodologies employed was answered via Study 1 and Study 2 comparisons. Finally, the results, strengths, and limitations of the current research are discussed in terms of their implications for the future research and practical application in health domain.

Literature Review

Health and Behaviour

Each year in Canada more than two-thirds of deaths result from four groups of chronic diseases – cardiovascular, cancer, type 2 diabetes, and respiratory ("The integrated pan-Canadian healthy living strategy," 2005; Statistics Canada, 2013a). An impressive body of research has

provided convincing evidence for the pivotal role that people's lifestyle plays in health maintenance, well-being, morbidity, and mortality of people (Redden & Haws, 2013). According to the World Health Organization, over 90% of type 2 diabetes and 80% of coronary heart disease could be avoided or postponed with good nutrition, regular physical activity, the elimination of smoking, limited alcohol consumption, and effective stress management (World Health Organization, 2009).

Smoking. Smoking is the health behavior most closely linked with long-term negative health outcomes. Morbidity and mortality from coronary heart disease are increased among smokers; it has also been linked to a number of cancers, including cancer of the lung, throat, stomach, and bowel as well as a number of more immediate negative health effects such as reduced lung capacity and bronchitis (K. M. Butler, Rayens, Zhang, & Hahn, 2011; Committee on Health and Behavior: Research, 2001). Despite the array of negative health outcomes, smokers often report positive mood effects from smoking and the use of smoking as a strategy for coping with stress (Darlow & Lobel, 2012; Mickens, et al., 2011; Piasecki, Piper, & Baker, 2010). The number of people smoking in Canada has shown a steady decline over the past ten years. Data from the Canadian Community Health Survey show that 20 percent of people over the age of 12 smoke in Canada and it is more common among men (23%) than women (18%) (Statistics Canada, 2013a). Importantly, those who quit smoking reduce the risk to their health, particularly if they quit before 35 years of age; however, young adults such as college students are less likely to quit smoking than older adults (Khuder, Dayal, & Mutgi, 1999).

Alcohol drinking. High alcohol consumption has been linked to a range of negative health outcomes including high blood pressure, heart disease, and cirrhosis of the liver. High levels of alcohol consumption have also been associated with accidents, injuries, crime, and unsafe sex

(Committee on Health and Behavior: Research, 2001; Galambos & Tilton-Weaver, 1998). While many of the adverse effects of high alcohol consumption are due to continued heavy drinking (e.g., cirrhosis of the liver, heart disease), others are more specifically related to binge drinking (e.g., accidents, violence). The Canadian Community Health Survey reports that 18 percent of people over the age of 12 drink heavily in Canada and about 17 percent do binge drinking (5 or more drinks on one occasion) at least once a month (Statistics Canada, 2013b). Heavy drinking is also more likely among younger age groups (32% among people aged 20-34, compared to people ages 45-64 (16%) and over (5%)), and among men (26%) than women (11%) (Statistics Canada, 2013a). At the same time, low to moderate alcohol consumption has been linked to positive health outcomes (such as reducing the risk of death from the cardiovascular causes) and has been recognized as a pleasurable and socially embodied friendship practice, especially among younger age groups (Niland, Lyons, Goodwin, & Hutton, 2013).

Physical activity. The potential health benefits of engaging in regular exercise include reduced cardiovascular morbidity and mortality, lowered blood pressure, and the increased metabolism of carbohydrates and fats, as well as a range of psychological benefits such as improved self-esteem, positive mood states, reduced life stress, and anxiety (Bennett, Conner, & Godin, 2004; Committee on Health and Behavior: Research, 2001). Nevertheless, a significant proportion of the population lead a sedentary lifestyle in Canada. The Canadian Community Health Survey (2013) indicates that only 54 percent of population aged 12 and older are moderately active or active and participate in leisure-time physical activity (Statistics Canada, 2013b). Participation in regular exercise is strongly related to a number of sociodemographic variables: overall, the typical exerciser is likely to be young, well educated, affluent, and male. Importantly, physical activity does not need to be vigorous to be beneficial to health. For people

who are inactive, even small increases have been associated with measurable health benefits (Burke, 2008).

Healthy eating. The impact of diet upon morbidity and mortality are well established (Committee on Health and Behavior: Research, 2001). In countries, such as Canada and the USA, the problems are predominantly linked to overconsumption of food. Excessive fat consumption and insufficient fiber, fruit and vegetable consumption are related to health problems such as cardiovascular diseases, strokes and high blood pressure, cancer, diabetes, and dental disease. In addition, excess consumption of calories has made obesity a major health problem (de Silva-Sanigorski, et al., 2010; Hsu, 2012; Redden & Haws, 2013). On the top of it, an increasing proportion of the population is eating outside the home, consuming larger portions of higher calorie and higher fat foods (Frazier, 2007; Tyrrell, Townshend, Adamson, & Lake, 2015). About half of Canadian population, aged 12 and over report being overweight or obese and the rates have been going up for the last ten years: 49% in 2003 and 54% in 2013. At the same time, fruit and vegetable consumption (5 times or more per day) is not changing: 41% in 2003 and 41% in 2013 (Statistics Canada, 2013a).

Thus, the current author's interest in smoking, alcohol drinking, physical activity, and healthy eating has been based upon assumptions that they have important impacts on health and well-being (that is, a significant proportion of the morbidity and mortality from the leading causes of death is caused by these behaviors), and that the behaviors are self-directed and modifiable (so that findings could have utility for health behaviours interventions).

Health behaviours of university students. Research suggests many adult behaviors are established during late adolescence, a time when many people attend college (Galambos & Tilton-Weaver, 1998; Wells, 2013). The transition to university, although offering students

increased autonomy and control over their health-related decisions, often results in unhealthy lifestyle choices including inactivity and poor nutritional habits, binge drinking, drug use, and tanning bed use (Bray & Born, 2004; Dinger & Waigandt, 1997; Greene & Brinn, 2003; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). At the same time, their participation in health-maintenance behaviours, such as physical activity, has been documented to decline (Seo, Torabi, Jiang, Fernandez-Rojas, & Park, 2009; Tucker & Irwin, 2011; US Department of Health and Human Services, 2000). This decrease in health-maintenance activities is particularly problematic because the greatest increase in obesity levels has been identified among 18- to 29-year-olds who enter university or have some college education (S. M. Butler, Black, Blue, & Gretebeck, 2004). In Canada, about 29 percent of university students[1] are overweight or obese, 12 percent report smoking (within the last 30 days), 71 percent report alcohol consumption, binge drinking during socializing (49%), and driving after having alcohol (19%); at the same time, only about half of student respondents (45%) meet the recommendations for exercising (moderate to intense cardio or aerobic exercise for at least 20-30 minutes on 3 or more days per week) and consume enough servings of fruit and vegetables per day (38% consume 3-4 servings and 13% 5 or more) (American College Health Association, 2013).

When implementing interventions, health professionals benefit by knowing more about the distinctive features of health behaviours among particular segments of the population. To design successful interventions specifically for students' needs, it is important to understand why, for instance, compared to their non-college peers, a greater percentage of students practice binge drinking, but fewer students smoke cigarettes (Quinn & Fromme, 2011; Wells, 2013). Overall,

[1]Thirty four Canadian postsecondary institutions self-selected to participate in the Spring 2013 ACHA National College Health Assessment (American College Health Association, 2013)

the health habits of university students seem to have received considerable scrutiny; however, the needs assessment studies among Canadian university students indicate that limited research on the topic has been conducted in Canada (Katz, Davis, & Scott-Findlay, 2002; Makrides, Veinot, Richard, McKee, & Gallivan, 1998; Sarvela, Huetteman, & Bajracharya, 1990). To address this need, smoking, alcohol drinking, physical activity, and healthy eating of Canadian university students have become the focus of the current research.

Multiple Health Behaviour Co-occurrence

Most health behaviors are not randomly distributed in any population, but occur together. Many people who drink also use tobacco; those who follow healthy dietary practices also tend to be physically active. While clear evidence exists for the co-occurrence of smoking and alcohol drinking, or physical activity and healthy eating (Adams & Mowan, 2005; Osler, 1998; Racette, et al., 2005; Seo, et al., 2009), the empirical evidence on the relations and clusters across the two groups is limited. Smokers, for example, have been reported to have worse diets (in terms of fats, fruit and vegetable consumption) than non-smokers (McClure, et al., 2009; Osler, 1998). No association has been recorded between smoking and physical activity levels (Seo, et al., 2009). Higher fruit and vegetable consumption has been related to a reduced likelihood of alcohol drinking in both men and women (Adams & Colner, 2008; M. C. Nelson, Lust, Story, & Ehlinger, 2009). And research investigating physical activity and alcohol drinking co-occurrence either failed to identify a relation or recorded a positive association, for example, among athletes (Moore & Werch, 2008).

Of the studies that investigated students' health behaviours, only a few examined their clustering patterns. For example, Mellen (2008) studied the clustering of health-risk behaviours and found that 57% of 912 students (in a convenience sample) and 54% of 378 students (in a

random sample) from the University of Iowa practiced three or more behaviours related to smoking cigarettes, smoking marijuana, low fruit and vegetable consumption, and physical inactivity. Similarly, from a convenience sample, Quintiliani et al. (2010) found 65% of 1,463 female students enrolled in a Northeastern University reported practicing more than two risk behaviors for alcohol consumption, smoking cigarettes, physical activity, fruit and vegetable consumption, risky sex, and cervical screening. Wells (2012) carried out additional investigation into co-occurring pairs of health behaviours among 928 undergraduate students of Colorado State University and found a relationship between smoking and alcohol drinking, smoking and physical activity, physical activity and fruit and vegetable consumption.

Still, the evidence is inconclusive regarding how health behaviours can co-occur and if there are regularities in how they cluster. Thus, there is a need for additional research into students' health behaviours clustering patterns so that researchers may be provided with the knowledge to design successful interventions to change more than one health behavior (Mellen, 2008; Noar, Chabot, & Zimmerman, 2008; Quintiliani, Allen, Marino, Kelly-Weeder, & Li, 2010).

Health Behaviours Regulations

The analysis of the literature suggests that the inadequate evidence regarding how health behaviors can co-occur and cluster is in part due to the lack of knowledge on what factors define and regulate their coexistence within individuals. A variety of motivational, cognitive and social contextual factors have been found to account for the performance of health behaviors.

Importantly, there are also studies indicating that health-risk behaviours can be self-regulated via health-maintenance behaviours within individuals. For example, developing a single health-maintenance behaviour was found to associate with decreased likelihood of

practicing a cluster of risk behaviours (Adams & Colner, 2008; Quintiliani, et al., 2010). Or, studies on smoking cessation programs repeatedly found that combining smoking cessation with physical activity and healthy eating promotion was most efficient in health intervention practice (Everson-Hock, Taylor, Ussher, & Faulkner, 2010; Nademin, et al., 2010).

Motivational regulations and Self-determination theory (SDT). Health motivation is one of the most important determinants of health behaviors as shown in previous research. However, findings regarding relations among motivational regulations of multiple health behaviours are limited and provide no consistent answers. They suggest that motivational regulations might transfer, or 'spill-over', from one behaviour to another (Lippke, Nigg, & Maddock, 2012; Mata, et al., 2009), For example, Mata et al. (2009) found the following "spill-over effect" in a weight management program: the participants' intrinsic or autonomous motivations for physical activity had a positive effect on their eating behaviour because those motivational regulations 'spilled over' and helped develop intrinsic or autonomous motivations for eating healthy.

Even though theories of health behavior do not currently address multiple health behaviours regulations, their insights into how motivational regulations emerge, develop and can be generally related prove to be useful. Self-Determination Theory (Deci & Ryan, 2000, 2002; Ryan & Deci, 2000, 2001) is one of those theories that offer a broad perspective on human functioning and processes that regulate health behaviours. In particular, it is concerned with the causes and processes through which individuals acquire motivation for initiating, maintaining, and changing activities over time (Ryan & Deci, 2000; Ryan, Patrick, Deci, & Williams, 2008).

Its fundamental assumption is that all individuals possess an inherent need to evolve and be integrated socially (Palmeira, et al., 2007; Ryan & Deci, 2002; Vansteenkiste, Niemiec, & Soenens, 2010) and that their behaviours are usually determined by a combination of several

types of motivational regulations (Ryan & Connell, 1989; Ryan & Deci, 2000; Ryan & Deci, 2002).

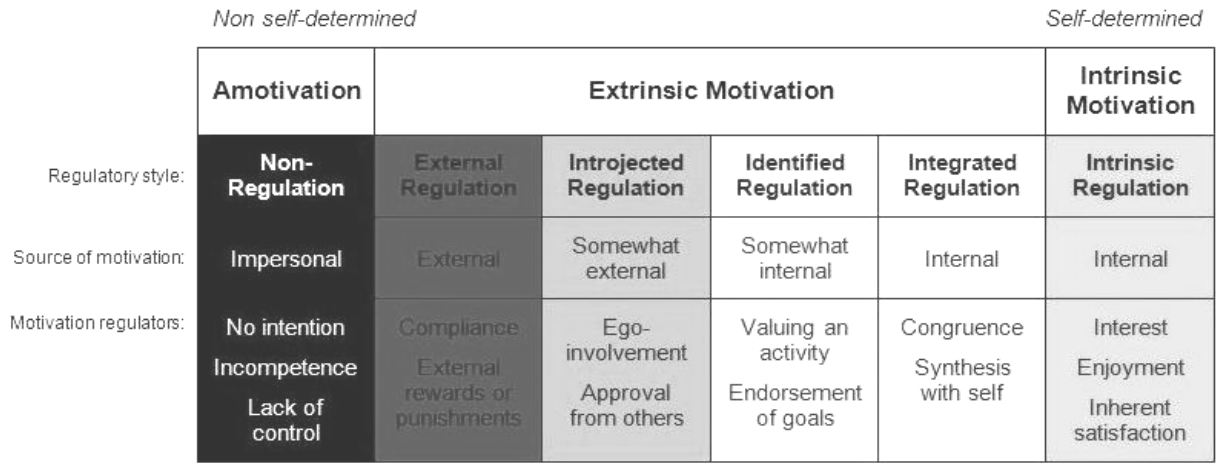

Figure 1-1. The Self-Determination Continuum

Amotivation represents a state of lacking the intention to act or engage in a behaviour (Ryan & Deci, 2000). When amotivated, individuals do not value an activity or the outcomes that it might yield resulting in acting without intent, or not acting at all (Ryan, 1995; Ryan & Deci, 2000). *External regulation*, the least self-determined extrinsic motivation, is an instance of being motivated to obtain rewards or avoid punishments. Behaviours that are externally regulated are often experienced as controlled and behavioural maintenance occurs generally in the presence of the control only (Markland, Ryan, Tobin, & Rollnick, 2005). *Introjected regulation* is a partially internalized external motivation when a person acts to avoid guilt, anxiety, or shame. This motivation is taken inside one's self, but is not accepted as one's own. Conventionally, external and introjected regulations are combined within one concept of *controlled* motivation. *Identified regulation* is is more self-determined and involves an acceptance of the behaviour as personally important. Then, the behaviour tends to be relatively autonomous or self–determined, but still not inherently enjoyable. *Integrated regulation* is a fully internalized motivation, when people's actions are performed by choice and are congruent with their other core values and needs.

Identified and integrated regulations are often referred to as *autonomous* motivations. Finally, *intrinsic motivation* represents the only true form of fully self-determined motivation, when an individual gets genuine internal pleasure, enjoyment or satisfaction as a result of engaging in a particular behaviour (Deci & Ryan, 2002; Ryan & Deci, 2000; Thøgersen-Ntoumani & Ntoumanis, 2006).

According to SDT, the most desirable form of motivation for health behaviour change is intrinsic motivation. As well, cultivating identified and integrated motivations (often referred to as autonomous motivations) is important for maintaining desirable behaviours over time: the more autonomously-regulated an individual is toward a given behaviour, the greater effort and stability the individual is likely to evidence in that behaviour (Ryan & Deci, 2000; Thøgersen-Ntoumani & Ntoumanis, 2006).

Another basic premise of SDT is that individuals have three innate psychosocial needs which are critical to supporting their optimal development and personal well-being: autonomy, competence, and relatedness (Ryan & Deci, 2000; Williams, 2002). The need for *autonomy* reflects the need to feel choiceful and volitional, as the originator of one's actions and behaviours. *Competence* involves the need to feel capable of interacting effectively with one's environment, mastering challenging tasks, and achieving desired outcomes; conceptually, it is similar to self-efficacy in social cognitive theory (Bandura, 1997). Finally, *relatedness* reflects the need to feel a meaningful connection with one's social context, such as feeling close to and supported by significant others (e.g., family and friends). By satisfying all of these basic needs through social interactions, enhancements to psychological growth and adaptability will occur, leading to improvements in overall well-being (Deci & Ryan, 2000; Ryan, et al., 2008).

SDT has been chosen in preference to other motivational theories to guide this study

because its tenets reflect my understanding of health motivation as an individual process which can, however, be affected by a number of external (e.g., social context of family and friends) and internal (e.g., health attitudes and psychological health empowerment) factors at the same time. It is also important that SDT has been successfully applied to many health promotion contexts and diverse populations (Edmunds, Ntoumanis, & Duda, 2009; Ferrand, Nasarre, Hautier, & Bonnefoy, 2012; Niemiec, Ryan, Deci, & Williams, 2009; K. Sheldon, Williams, & Joiner, 2003; Williams, et al., 2002). For example, the more self-determined motivation has been found to lead to a number of positive cognitive (e.g., concentration), affective (e.g., positive affect), and behavioural (e.g., persistence) outcomes in sport settings (Boiche´, Sarrazin, Grouzet, Pelletier, & Chanal, 2008; Kowal & Fortier, 1999; Pelletier, Fortier, Vallerand, & Briere, 2001); an autonomous motivation was positively associated with healthy eating behaviours and related to improvements in weight parameters (Pelletier, Dion, Slovinec D'Angelo, & Reid, 2004). In a similar fashion, the motivational processes were found to operate across education, work, relationships, health, and environmental issues (Vallerand, Pelletier, & Koestner, 2008). That similar findings have been consistently obtained across a host of domains and outcomes, in line with the theoretical tenets of SDT, was considered a testament to the breadth of the theory as well as its internal and external validity.

Cognitive factors. Cognitive components of health behaviour regulation, such as health attitudes, expectancies, perceptions of autonomy, competence, and self-control, have long been recognized and reflected in many studies based on SDT and other theories, such as health beliefs model (Rosenstock, Strecher, & Becker, 1988), theory of planned behavior (Ajzen, 1991), or stages of change theory (J. O. Prochaska & DiClemente, 2005). For example, ‘stress release’ health attitudes have been found to be longitudinal predictors of smoking and intention to smoke

among students (Darlow & Lobel, 2012); college freshmen's social alcohol expectancies have been recorded to add legitimacy to their alcohol consumption leaving the alcohol amount less important (Grant, Brown, & Moreno, 2013); and fostering perceptions of competence and autonomy across the transition to university have been found to support declining motivation for physical activity (Ullrich-French, Cox, & Bumpus, 2013).

Recently, self-control, individuals' autonomy, competence, as well as related concepts of self-efficacy and mastery (Bandura, 1997), have started to be considered within a larger cognitive concept of (psychological) health empowerment, which is viewed as a positive regulatory force that could help make healthy lifestyle choices via strengthening young people's agency, autonomy, competence, and resilience (Lindsay, 2009; Spencer, 2013). Health empowerment does not unproblematically transpire into positive health outcomes though, and full understanding of its possibilities has not been reached yet (Gibson, 1991; Spencer, 2013). To address this gap, health empowerment and related cognitions (health attitudes and perceptions) were investigated alongside motivations in the regulation mechanisms of multiple health behaviours among Canadian university students.

Social contextual factors. SDT is a theory that explicitly recognizes that the social context influences health behaviours and incorporates it (together with cognitive factors) in predicting motivation for those behaviours and individual health outcomes (Peterson, et al., 2007; Rocco & Suhrcke, 2012; Shabana, 2007). However, the concept is too complex and ambiguous to be applied in social psychological research directly (Morgan & Swann, 2004). To this end, interpersonal contexts, such as family and friends, have been often focused on.

The previous literature have repeatedly found family and friends to create norms and social networks that could support individuals' basic psychological needs, such as competence,

autonomy, and relatedness, and define these individuals' patterns of behaviour (Deci & Ryan, 2008; Morgan & Swann, 2004; Rocco & Suhrcke, 2012). For example, social norms and social networks were found to influence whether or not people smoked: adolescents were more likely to smoke if their friends did (Gritz, et al., 1998), and about half of college smokers identified themselves as "social smokers," that is, those who mostly smoked in the presence of others or at parties where consuming alcohol and smoking was normative (Moran, Wechsler, & Rigotti, 2004; Nichter, Nichter, Carkoglu, Lloyd-Richardson, & the Tobacco Etiology Research Network (TERN), 2010). On the related note, social drinking, as a phenomenon on its own, has become the focus of numerous health-related studies among college student populations (Foster & Neighbors, 2013; Grant, et al., 2013; Lyvers, Simons, Hayes, & Thorberg, 2014).

Noteworthy, social contexts of physical activity and healthy eating have been less studied in comparison to smoking and alcohol drinking. It has been found that social support and integration generally promote health-maintenance behaviours (Cohen, 2004; Tamers, 2011), but understanding of their specific impacts on physical activity levels and healthy eating is still limited (Rouse, Ntoumanis, Duda, Jolly, & Williams, 2011). For example, friendships and exercising in groups have been reported to increase motivation for physical activity in non-overweight and overweight young adults, but the results are not conclusive yet and require further empirical research. Likewise with healthy eating, although many studies have acknowledged that social relationships define people's eating habits and their dietary change process (Ryden & Sydner, 2011; Salvy, Kieffer, & Epstein, 2008), the nature of the influence (inhibiting or promoting) has not been investigated yet (C. C. Nelson, Sapp, Berkman, Li, & Sorensen, 2011). Thus, it became the aim of the current study to explore the influence of the interpersonal social context of Canadian university students in more depth, in particular, to

investigate its relations to health motivations and cognitions in the mechanisms of multiple health behaviours regulation.

Methodological Approaches to Study Health Behaviours

The bulk of the literature on health behaviours of college students focuses on the determinants of their behavioural patterns and health outcomes and investigates the factors best predicting their health-risk or health-maintenance lifestyle choices (Guerin, Bales, Sweet, & Fortier, 2012; H. S. Lee, Catley, & Harris, 2012; Wells, 2013). There is also an extensive body of research on the associations between their motivations and such supporting factors as health attitudes and social context (Hagger, et al., 2014; Ng, et al., 2012; Xu, 2010). Conventional to social psychology, those studies used a variable-based approach, grounded in a postpositivist perspective and utilizing statistical analyses to investigate between-subject regularities among relevant health variables. However, explanations of causal relationships and the underlying regulation mechanisms of multiple health behaviours have often been beyond their grasp.

Qualitative studies in the field, often utilizing a social constructionist paradigm and a case-based approach, have added some understanding to how those unobservable mechanisms might work, with the caveat that their findings could be limited to the specific contexts and subgroups of the population they had researched (Gronkjaer, Curtis, de Crespigny, & Delmar, 2013; Vahasarja, et al., 2015). For example, O'Dougherty, Kurzer and Schmitz (2010), while analyzing motivations expressed by young, healthy, sedentary women before and after an exercise intervention, found that they had been experiencing multiple motivations simultaneously (controlled, autonomous, and intrinsic) and those could be related to their other health behaviours, such as quitting smoking or controlling over their weight.

Mixed methods research has been recognized to improve understanding of how health

behaviours are regulated by providing a more comprehensive picture than either method can alone. Still, very few published studies use them in the health domain (Posadzki, Stockl, Musonda, & Tsouroufli, 2010; Wisdom, Cavaleri, Onwuegbuzie, & Green, 2012). Moreover, it has been noted that very few studies incorporated the results to answer the same research questions; rather, qualitative and quantitative methods were used to answer different, although related, research questions (Bryman, 2007; Mengshoel, 2012).

To address the need of health research for more mixed method inquiries into how multiple health behaviours could be self-regulated, variable-based and case-based approaches were integrated in the design of the current study.

Purpose and Objectives of the Present Study

Based on the review of the previous literature, I concluded that coexistence of multiple health behaviours among Canadian university students was an interesting but underresearched topic; that common underlying mechanisms could regulate those behaviours within an individual; that motivations, cognitions, and social context could be important components of those hypothetical mechanisms; and that there has been no well-established methodology to investigate the topic.

The purpose of the study became to address the outlined theoretical gaps and, in doing so, to help address the practical issue of developing more effective, economical and less demanding health promotion initiatives that would target Canadian university students.The objectives of the present study were set as follows:

1. To explore how smoking, alcohol drinking, physical activity, and healthy eating coexisted and were jointly regulated on a sample of Canadian university students; and
2. To apply variable-based and case-based approaches to study the components of their

regulations.

The conceptual framework for the current Study was developed utilizing the main tenets of the Self-Determination Theory (SDT) and the critical realism paradigm and it is presented in the next chapter.

Chapter 2
CONCEPTUAL FRAMEWORK OF THE PRESENT STUDY

Health, Health Behaviours, and Related Concepts

Health is sometimes negatively defined as the absence of disease and injury, sometimes as a normative judgment referring to the average state of most people, and sometimes as a positive concept of well-being (Committee on Health and Behavior: Research, 2001). Following the definition introduced by the World Health Organization (WHO), in this study *health* is not equated with the absence of disease, but is seen as a harmonious combination of physical, mental, emotional, and social well-being (Low & Thériault, 2000; Wass, 2000). In particular, *physical health* is defined as a harmonious functioning of all physiological systems and *psychological well-being* as a combination of positive mental and emotional conditions that accompanies a person's life.

In describing health behaviors it is common to distinguish health enhancing, or *health-maintenance behaviours*, from health impairing, or *health-risk behaviors*. *Health-risk behaviours* have been proved to undermine people's physical health and psychological well-being or otherwise predispose individuals to disease. Such behaviors include smoking, excessive alcohol consumption, sedentary lifestyle, and poor dietary practice. In contrast, engagement in *health-maintenance practices* conveys health benefits or otherwise protects individuals from disease. Such behaviors include physical activity and healthy eating. A key property of health behaviours is that they tend to co-occur, or cluster, meaning that both health-risk and health-maintenance practices may simultaneously coexist and form relatively stable *multiple health behaviour clusters*.

In the current research (the full list of all health definitions is attached in Appendix A), smokers are defined as *occasional smokers* when the frequency of their smoking ranges from

low (1-10 days a month) to moderate (11-20 days a month), and they are considered to be *daily smokers* when they smoke 21-30 days a month. Depending on the intensity of their smoking, they can be *light smokers* (1-10 cigarettes a day), *moderate smokers* (11-19 cigarettes a day) or *heavy smokers* (20 and more cigarettes a day) (Statistics Canada, 2009). Alcohol drinkers (beer including) are defined as *low-risk drinkers* when their drinking ranges from low (1-10 days a month) to moderate (11-20 days a month), and they are considered to be *high-risk drinkers* when they drink 21-30 days a month. Depending on the intensity of their drinking, they can be *social drinkers* (1-4 drinks on a single occasion) or *binge/heavy/excessive drinkers* (more than 5 drinks on a single occasion)(Canadian Centre on Substance Abuse, 2013). Young adults are considered to be *physically active* when they do moderate-to-vigorous activities, such as running, swimming, fast bicycling or strengthening exercises, and their frequency of engagement is either *low* (1-10 days a month), *moderate* (11-20 days a month) *or high* (21-30 days a month). Likewise, they are considered to be *eating healthy* when their meals (at least one a day) include such healthy foods as fruit and vegetables, low processed food, low in fat, or organic food, and they avoid such unhealthy foods as fast food, sugar drinks, highly processed food or fatty food. Their frequency of engagement can be *low* (1-10 days a month), *moderate* (11-20 days a month) *or high (*21-30 days a month).

Health behaviours can be influenced by a number of factors, working from outside and inside individuals. In the context of the current study, *health behaviour regulation* is defined as an outcome of competing influences (external and internal) that contribute to the individual's health motivation but are balanced and decided upon by the individual (Sniehotta, 2009). Motivation is conceptualized as a central component of health behaviour regulation. In the context of SDT, *health behavior motivation* is defined as a combination of three basic forms of

regulations which differ in the type of internalization that has taken place. *Controlled motivation* (a combination of external and introjected forms of motivational regulation) is an instance of an individual's regulation not being fully accepted as one's own and working in its original external form, that is, to obtain rewards or avoid punishments, guilt, anxiety, or shame. *Autonomous motivation* (a combination of identified and integrated forms of motivational regulation) involves an acceptance of the behavior as personally important and the outcome of the activity is congruent with an individual's core values and needs. *Intrinsic motivation* is a case of full internalization, when an individual develops an interest for doing the activity itself and consequently finds it enjoyable and its results satisfying (Ryan & Deci, 2002)[2]. All three forms of motivations might be interrelated, function at the same time and create a hierarchy.

Health motivations are under the influence of both internal (e.g., cognitive) and external (e.g., social contextual) factors. In the context of the current study, *health attitudes* are defined as cognitive evaluations of health importance and an individual's responsibility for health. *(Psychological) health empowerment* is recognized as a cognitive state characterized by perceptions of one's own agency, control regarding one's own health, and competence regarding one's ability to maintain good health (Nocon, Keil, & Willich, 2007).

People influence and are influenced by their families and social networks, the organizations in which they participate, their communities, and their society. As a descriptive concept, social context is too complex and ambiguous to be applied in social psychological

[2] Prior literature suggests that amotivation is a vague construct: it can mean a lack of motivation associated with feelings of incompetence and lack of control (Deci & Ryan, 1985; Pelletier, et al., 2004), or a negative driving force that should be distinguished from a lack of positive drive in the form of controlled, autonomous or intrinsic regulation (Ingledew & Markland, 2008; Teixeira, Carraca, Markland, Silva, & Ryan, 2012), or even the motivation against engagement in a behavior (Ryan, Williams, Patrick, & Deci, 2009; Vansteenkiste, et al., 2010). That is why amotivation was not considered among the components of motivational regulation in this study.

research directly (Morgan & Swann, 2004). Narrower conceptualization of the concept, focusing on the interpersonal environment created by family and friends, is used in the current study. *Social context* is envisioned as a dynamic force, which affects individuals embedded within a given social structure by supporting or thwarting their basic psychological needs (Chirkov, Lebedeva, Molodtsova, & Tatarko, 2011).

The prism of the critical realism paradigm has been used to conceptualize about the relations among the components of the regulation mechanisms underlying multiple health behaviours under study (smoking, alcohol drinking, physical activity, and healthy eating).

Critical Realism

Critical realism is often recognized as a 'third way' philosophical approach to social science research (Reed, 2009) which can successfully avoid the traditional quantitative-qualitative divide between positivism/postpositivism and social constructionism (Cooper, Glaesser, Gomm, & Hammersley, 2012). It believes that there is a 'real' world to discover even though it is only imperfectly apprehensible (Guba & Lincoln, 1994; Healy & Perry, 2000). This world consists of abstract things that are born of people's minds but exist independently of any one person. Thus, critical realism's world is different from the very objective world of positivism/postpositivism and the very subjective world of constructionism.

According to critical realism (Bhaskar, 1997), reality is stratified into three layers: 'the empirical' (consisting of sense-experiences and perceptions), 'the actual' (consisting of observable events and activities), and 'the real' (consisting of unobservable structures and powers, such as ideas and meanings). In the context of the current research, multiple health behaviours are observable at the actual level, can be described at the empirical level, but should be explained at the real level by analyzing underlying mechanisms of their regulation. In that, the ontological position of the critical realists is different from the social constructionists (who admit

the existence and importance of the subjective only), and the positivists who refuse to admit the existence of underlying mechanisms that cannot be experienced or observed directly.

It is also important to note that according to critical realism, the world is unified and yet differentiated (Bhaskar, 1993). Some abstract unifying determinants, such as underlying regulation mechanisms, can be identified to systems. However, at more concrete levels, such as individual cases, these regularities develop into forms that have their own unique and differentiating features, specific to the contexts in which they exist. Thus, critical realism without denying the utility of statistical abstract regularities, urges researchers to infer the unobservable psychological mechanisms via a case-based approach.

As such, these mechanisms are inaccessible by statistical methods because they operate within individuals embedded in particular contexts. But at the same time, these mechanisms are beyond the reach of a social constructionist approach either because the latter assumes the 'rejectionist' position on causality (Cooper, et al., 2012; Reed, 2009). Unlike them, critical realism endorses generalizing about relations that occur across people, time, and places ('generative mechanisms') and allows making causal statements about the effects they can produce in specific contexts (Danemark, Ekstrom, Jakobsen, & Karlsson, 2002). Critical realism theory of causal powers suggests that even though we cannot directly see a mechanism at work (even if that mechanism is "absent" to us) it is still an ontological entity which might affect us in some way or another. Indeed, because the world is complexly layered and stratified it is always the case that some kind of absence will impact on us. Such is, for example, the case with the whole scientific progress: scientists make new discoveries by gaining deeper knowledge about causal mechanisms that were previously unknown to them.

It was also important for the purpose of this study that critical realists share the social

constructionists' perspective regarding social and interpretative nature of knowledge (Maxwell, 2012; Reed, 2009). Events do not simply impinge themselves upon people, but it is people's perceptions of those events that motivate them to respond accordingly. Indeed, all human behaviour is always interwoven with meaning (Graham, Bray, & Martin Ginis, 2014), and our knowledge about it can never be treated as complete or infallible (Maxwell, 2012). Moreover, any knowledge gained is always perceived to be 'contextualized', that is, to be a social product of particular circumstances in time and place. Hence, critical realists always study 'local' causality of individual cases but never claim to predict 'general' causality, as positivists do (Huberman & Miles, 1985).

Conceptual Framework of the Present Study

Taking tenets of critical realism on board, I assumed that there might be 'absent' unobservable mechanisms that regulate co-occurrence of multiple health behaviours within individuals. Those mechanisms regulate coexistence of both health-risk and health-maintenance practices.

Motivation is their central element. However, it is a complex entity because it can have a multilevel structure (controlled, autonomous, and intrinsic components in different hierarchical combinations) and this structure is dynamic and potentially susceptible to the influence of numerous external and internal factors such as social context, cognitive and emotional experiences. It is important to mention that all those factors can potentially interact with each other in a reciprocal way and be part of other underlying mechanisms, but, for the purpose of the study and to avoid unnecessary complexity, only those few (health attitudes, health perceptions, health empowerment, social context of family and friends) whose influence was strongly suggested by the previous findings (Niland, et al., 2013; Posadzki, et al., 2010; Skeer & Ballard,

2013; Wong & Rowland, 2013) were included into the research and the focus was primarily on their influence on health motivation.

Within the current conceptual framework, I assume that together with health cognitions (health attitudes, health perceptions, and health empowerment), motivation constitutes a driving and regulatory force for all health behaviours of an individual. Importantly, those regulations happen in a particular social context (interpersonal environment created by family and friends), lead to particular health behaviours (or their particular combinations) and result in certain health outcomes (physical and psychological), which in their turn can have an impact on an individual's cognitions and motivations.

Implications for the design of the research. The identification and mapping of the regulation mechanisms for smoking, alcohol drinking, physical activity, and healthy eating, became central to the logic of this research design. The regularities between variables identified by statistical analyses in Study 1 were regarded as manifestations of some aspects of 'absent' generative causal mechanisms. In Study 2, common causal relations, identified by comparative analysis between cases (using textual analysis, within-case matrices, and between-case display models), were regarded as indicative of the same underlying mechanisms, but from a different, more concrete level. Common elements, supported by Studies 1 and 2 results, were considered a possible approximation to the elements of the real generative regulation mechanisms of health behaviours.

Importantly, all the health concepts were kept consistent and congruent. The concepts were clearly defined and the same definitions applied to Study 1 scales and Study 2 interview questions. In Study 2 results and Studies 1 and 2 comparisons, the interviewee's own definitions and conceptualizations were described and used when applicable.

Research Questions

The purpose of the current project, previous findings, and the developed conceptual framework defined the focus of the research questions:

1. What are the statistical associations and the participants' reasoning behind coexistence of smoking, alcohol drinking, physical activity, and healthy eating?
2. What are the hypothetical mechanisms of multiple health behaviours regulation, including motivational, cognitive and social contextual components?
3. What are the advantages and limitations of combining the chosen methodologies (variable-based and case-based approaches)?

Study 1 and Study 2 were designed to explore the research questions 1 and 2 using variable-based and case-based approaches. Question 3 was an overarching question for the study and would assess the utility of integrating those approaches within one project. It was hoped that bringing quantitative and qualitative findings together would have the potential to offer insights that could not otherwise be gleaned.

Expected Limitations and Biases

There were certain limitations and biases that may restrict the scope of the study or influence the outcome. For example, the researcher´s personal experience, beliefs, and feelings may have influenced the research methods and inferences about the results. Specifically, the researcher´s perspective regarding the topic under study and the approaches to study it could be vulnerable to personal bias.

I began this endeavor as part of a bigger cross-cultural project, examining social context, motivations, and health-related behaviours of Canadian and Russian university students (Chirkov, et al., 2011). While working in the research team, I became particularly interested in

how multiple health behaviors could co-occur and coexist within individuals. I started wondering if they could have common underlying regulation mechanisms. After exploring the literature and doing the preliminary analyses, the complexity of the issue became evident. The field of health behavior regulation is very large. I had to make hard choices about what to include and exclude from the study. First, the focus of the study was narrowed down from a broader socio-cultural perspective on health attitudes and health motivations of Canadian university students to the coexistence and regulation of four health behaviours. Then, a number of areas were excluded (e.g., only the social contexts of family and friends were focused on). Finally, the methodological apparatus was limited to a survey and an interview to see if the integration of their findings would be possible.

It was expected that there might be serious limitations to integrating variable-based and case-based findings. Previous mixed methods research indicates that a substantial integration of qualitative and quantitative data during the analysis has been rarely exercised (Bryman, 2007). The reasons ranged from the tendency to think of quantitative and qualitative research as discrete domains to practical difficulties of intertwining the findings because they were largely independent of each other, or one set of data turned out to be more intrinsically interesting than the other set. Importantly, those difficulties cannot be predicted, or dealt with, at the stage of research design. Mindful of that, I structured the research into two parts: first, the results of variable-based and case-based approaches were analysed; and only then, their findings were compared and possibilities of integration were assessed. The paper follows the same structure: chapter 3 presents the survey findings, chapter 4 analyses the interview data, and chapter 5 considers if their finding were mutually illuminating and discusses strengths, limitations, and implications of the whole project.

Chapter 3
STUDY 1

Study 1 was designed to explore the patterns of multiple health behaviour co-occurrence among Canadian university students and to study the statistical regularities behind their coexistence and regulation, including the influence of motivational, cognitive and social contextual factors. The study was conducted within a bigger project, entitled *Social Context, Autonomy and Health Behavior of Young Canadians* and a questionnaire was used to collect the data. The survey respondents were also used as a pool of prospective interviewees for case-based Study 2.

Design and Method

Participants

College students (*N*=238) from the University of Saskatchewan (between 17 and 31 years, born in Canada) were recruited via the Psychology Participant Pool (see Table 3-1).

The optimal sample size for the survey was defined using the results of the previous related research (Chirkov, et al., 2011), where the effect size varied from medium (r= .3) to large (r= .5). With α set at .05 and power (1-β) set at .95, a required sample size to detect the same effects was estimated to be between 42 and 134 people (Faul, Erdfelder, Buchner, & Lang, 2009).

Table 3-1. Respondents' demographic and health behaviours information (N = 238)

Category	n	%
Gender		
Women	167	70.2
Men	71	29.8
Age (years)		
Mean	19.59	
SD	2.36	
Range	17-31	
Ethnic background		
Euro-Canadian (English)	203	85.3

Euro-Canadian (French)	5	2.1
Aboriginal/Metis	8	3.4
Asian-Canadian	9	3.8
Other	12	5
Income		
<10,000	8	3.4
10,000-25,000	12	5
25,001-40,000	30	12.6
40,001-70,000	67	28.2
70,001-100,000	73	30.7
>100,000	48	20.2
Smoking (frequency)		
Daily smokers (21-30 days)	13	5.5
Occasional smokers (1-20 days)	18	7.5
Do not smoke	207	87
Smoking (intensity)		
Light smokers (1-10 cigarettes a day)	31	13
Alcohol Drinking (frequency)		
Low-risk drinkers (1-20 days)	184	77.3
Do not consume alcohol	54	22.7
Alcohol drinking (intensity)		
Binge drinking (5 drinks or more on 1 occasion)	141	59.2
Social drinking only	42	17.6
Physical Activity (frequency)		
High on physical activity (21-30 days)	42	17.6
Moderate on physical activity (11-20 days)	77	32.4
Low on physical activity (1-10 days)	100	42
Are not physically active	19	8
Healthy Eating (frequency)		
High on healthy eating (21-30 days)	126	52.6
Moderate on healthy eating (11-20 days)	100	42
Low on healthy eating (1-10 days)	11	4.6
Do not eat healthy	2	.8

Note. Frequency=frequency of engagement during the last 30 days.
Percentages that do not total 100% are due to missing values.

The data demonstrated that the sample had a representation of different patterns of engagement in health behaviours and answered the needs and requirements of the current research (see Table 3-1).

At the same time, the sample demonstrated features differentiating it from the general population of Canada, aged 12 -34 in 2008-2009 (Statistics Canada, 2013a, 2013b). In particular, there were fewer current smokers, daily or occasional, among university students (13%) compared

to 20% among Canadians aged 12-19 and 19.7% among Canadians aged 20-34. More survey respondents reported binge drinking (59.2%) than other Canadians did (24% among Canadians, aged 12-19 and 29.2% among Canadians aged 20-34). The sample was also more physically active and only 8% reported physical inactivity (29.6% among Canadians, aged 12-19 and 38.4% among Canadians aged 20-34 were not physically active). As for healthy eating, it was difficult to compare, because while survey respondents reported their frequency of eating various healthy foods (including fruit and vegetables, low processed food, low in fat, or organic foods), only fruit and vegetable consumption (5 times or more per day) was measured by the Canadian Community Health Survey (57.8% among Canadians, aged 12-19 and 44.4% among Canadians aged 20-34). As a result, a wrong impression was created that the survey respondents were eating healthier than general population: 52.6% reported eating at least one healthy meal a day 26-30 days during the last 30 days and 42% reported eating it every other day (11-20 days a month).

Measures

The scales and single-item measures targeted the respondents' health behaviours and motivational, cognitive and social contextual components of their regulation (see Appendix B).

Health behaviours. Four single-item measures from the Youth Risk Survey (Centers for Disease Control and Prevention, 2008) were adapted. They asked about past 30-day frequency of engagement (e.g., "During the past 30 days, on how many days did you have at least one drink of alcohol (beer including)?") and the answer format had seven options (1=0 days, 2=1-5 days, 3=6-10 days, 4=11-15 days, 5=16-20 days, 6=21-25 days, 7=26-30 days). Two single-item measures were used for the intensity of smoking and alcohol drinking (e.g., "During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?").

For the purpose of the study, indicators of physical activity (mean scores for the frequency of aerobic and muscle-strengthening physical activities), healthy eating (mean scores for the frequency of healthy eating and reversed unhealthy eating) and the single-item measures of frequency of smoking and alcohol drinking were used in further statistical analyses.

A multiple health behaviour co-occurrence index was created on the basis of the respondents' answers about past 30-day frequency of smoking, alcohol drinking, physical activity and healthy eating. In a new variable, each respondent was assigned a number which reflected his/her combination of co-occurring health behaviours. For example, 1="smk+alc+physact+diet" was assigned to the respondents who reported engagement in smoking, alcohol drinking, physical activity, and healthy eating from 1 to 30 days. If a respondent reported 0 days of engagement in a certain behaviour, that behaviours was absent from his/her cluster: for example, 2="alc+physact+diet" meant that a responded reported 0 days of engagement in smoking and 1 to 30 days of engagement in alcohol drinking, physical activity and healthy eating (see Table 3-5 for a full list of clusters in the sample). The index was used in frequency analysis and as a selection criterion for Study 2.

Health motivation. Motivational regulations were assessed by modified Self-Regulation Questionnaire of 20 items (Redden & Haws, 2013), based on earlier SDT research by Ryan, Connell, Vallerand and others (Ryan & Connell, 1989; Vallerand & Rattelle, 2002). Five possible reasons (according to five motivational regulations defined by the SDT) were provided for the question "Why do you do this health behaviour?" For each health behaviour, the participants were asked to rate each reason in terms of the degree to which it applied to them on a 5-point scale (with anchors 1 = Not at all characteristic and 5 = Extremely characteristic). For the purpose of the study, the following indicators were used in statistical analyses: controlled

(external and introjected regulations combined), autonomous (identified and integrated regulations combined) and intrinsic motivational regulations.

Health cognitions. *Health attitudes* were measured by four single-item measures: "How important is health to you?"(with anchors 1=Not important at all and 7=Very important), "How much does health depend on people's behaviour?" (with anchors 1=Does not depend at all and 7=Depends entirely), "How much are people responsible for their health?" (with anchors 1=Not responsible and 7=Responsible), and "How typical is healthy lifestyle among people?" (with anchors 1=Very unusual and 7=Very typical).

The *health perceptions* scale was adapted from Ware's (1976) Health Perceptions Questionnaire (Emmons, 1991; McDowell & Newell, 1996). Participants were asked to express agreement or disagreement with five health-related statements, such as "I expect to have a very healthy life", and rate it on a 7-pont scale (with anchors 1=Strongly disagree and 7=Strongly agree). The alpha coefficient for the scale was .69.

The *health empowerment* scale was adapted from the earlier work by Menon (2002). Its 14 items measured perceived control and autonomy (e.g., "Please indicate how much freedom of choice you feel you have over the way your life turns out" with anchors 1=Not at all and 7=A great deal), competence (e.g., "I believe I'm able to make the right decisions to maintain good health" with anchors 1=Strongly disagree and 7=Strongly agree), and agency (e.g., "I have the resources to maintain good health" with anchors 1=Strongly disagree and 7=Strongly agree)[3]. The alpha coefficient for the scale was .85.

Health outcomes. *Physical health* was measured by a single-item measure of self-reported health status ("How would you describe your present state of health these days?" on a 7-point

[3] Subscale analysis was not possible because one of the subscales (agency) was one item only.

scale with anchors 1=Very poor to 7=Very good) and Emmons' (1991) somatic symptoms checklist of 10 items. Participants were asked to indicate on how many days during the past 30 days they had experienced such symptoms, as headaches, chest/heart pain, disturbances with sleep (to rate on a 7-point scale ranging from 1=0 days to 7=21-30 days). The reversed scores (ranged 2.10-7.00) were used as a measure of self-reported physical health. The alpha coefficient for the scale was .75.

To measure *psychological well-being*, Ryff's (1995) scale of Psychological Well-being was used. Its 18 items measured self-acceptance (e.g., "I like most aspects of my personality"), positive relations (e.g., "People would describe me as a giving person, willing to share my time with others"), autonomy (e.g., "I judge myself by what I think is important, not by what others think is important"), environmental mastery (e.g., "I am quite good at mastering the many responsibilities of my daily life"), purpose in life (e.g., "Some people wander aimlessly through life, but I am not one of them"), and personal growth (e.g., "For me, life has been a continuous process of learning, changing, and growth"); the anchors were 1=Strongly disagree and 7=Strongly agree. The alpha coefficient for the scale was .77.

Social context. Two scales assessed how parents and friends provided support for the participants' basic psychological needs of autonomy (e.g., "My parents, whenever possible, allow me to choose what to do"), competence (e.g., "My friends convey confidence in my abilities"), and relatedness (e.g., "My friends care about me"). The questionnaires were adapted from the previous SDT health research (Chirkov, Ryan, & Willness, 2005) and used the anchors 1=Strongly disagree and 7=Strongly agree. The first scale consisted of 15 items and the alpha coefficient for it was .89. The second one consisted of 13 items and its alpha coefficient was .85.

Procedure

Pen-and-pencil self-administered questionnaires were used during a series of group survey sessions in 2008-2009 attended by approximately 10 people each (Appendix B). After reading, signing, and returning an informed consent form approved by the University of Saskatchewan Behavioural Research Ethics Board (Appendix C), the participants completed the survey, following the instructions, presented in the introduction to the survey. Also, an introductory part of the survey asked the participants to leave their contact information if they were interested in partaking in follow-up interviews for Study 2. They were also asked to create a unique identification code that would protect their confidentiality and would link their contact information with their survey data only. Each session was approximately 45 minutes. The participants were then thanked and the debriefing forms were handed out at the end of each session (Appendix D).

Data Analysis

The choice of statistical tests was based on the intent of the research questions: 1) preliminary analyses were conducted to ensure data were complete and the relevant assumptions of normality and linearity were checked; 2) means, standard deviations, and Pearson correlations were computed between all scale variables by gender; 3) mean differences between students were compared based on gender;4) principal components analysis was used to reduce the number of predictors to be entered into regression analysis; 5) frequency analysis of multiple health behaviour co-occurrence index, descriptive analysis of its clusters, mean difference, based on those clusters, and correlational analysis of motivations within those clusters were used to answer Research Question 1; 6) hierarchical multiple regression analyses were used to determine the best predictors of health behaviour frequency (among motivational, cognitive and social

contextual factors) to answer Research Question 2.

Results

Preliminary Analyses

There were few missing data points and they seemed to be distributed randomly[4]. Composite variables were created based on the average of completed items when there were a few missing data points scattered throughout the items in a multi-item scale (which happened in 0.4-0.8% of cases[5]). Next, scores from the primary measures were computed and standard preliminary analyses were performed on all variables, including assessing univariate and multivariate normality and linearity, checking for outliers, and assessing correlations among the predictor variables (for multiple regression analyses). There were no concerns with respect to outliers, except that two cases were removed because the respondents' age was beyond the definition of young adult (52 and 51 years old). Table 3-2 presents intercorrelations of all the study scales by gender and Table 3-3 shows their means, standard deviations, skewness and kurtosis statistics. The largest absolute values for skewness (2.26) and kurtosis (9.26) were still below the absolute values that pose problems in regression analysis (i.e., skewness>3.00 and/or kurtosis >10.00); thus no variable was transformed.

Health behaviours were found related in ways suggested by previous literature: smoking frequency correlated with smoking intensity (for women), alcohol drinking was positively related to alcohol drinking intensity and smoking intensity (for men), frequency of physical activity positively correlated with the frequency of healthy eating (for women). Interestingly, eating

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[4] The data were missing for the demographics variables: it was missing in 3.5% of the cases for the GPA item, in 3.5% of the cases for the Income item and in 0.9% of the cases for the item Mother's education. New variables with the average scores for the missing data were computed for those items. Missing data for Ethnic background item (0.4%) was left unchanged.

[5] The data were missing in 0.4% of the cases for 11 items and in 0.8% of the cases for 1 item.

healthy was negatively correlated with alcohol drinking and smoking intensity (for men). Strong correlational support was found for interrelations among motivations for the same health behaviours and among motivations of the same kind across multiple health behaviours. There was correlational evidence that cognitive and social contextual factors were related to the frequency and intensity of health behaviours and health motivations. For example, health attitudes (the importance of health) positively correlated with the frequency of physical activity and healthy eating and their autonomous motivations in women, and basic psychological needs support by parents and friends negatively correlated with controlled motivation for alcohol drinking in men.

Table 3-2. Pearson Correlations among the Scale Variables by Gender (N=238)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1.Smk_frq	--	60*	-.11	-.15	.18	-.41	-.40	.35	.51	.38	-.24	-.06	-.11	-.19	-.53*	.05	.16	.02	.11	.23	.20	.02	.25	.11	.12	.20	.13	.32	-.01
2.Smk_int	.49	--	.17	.02	-.08	.03	-.32	-.18*	-.05	.03	-.35	-.02	-.02	.00	-.16	.06	-.11	.00	-.09	.15	-.01	-.04	-.05	-.03	-.08	-.02	-.09	.05	.16*
3.Alc_frq	.13	.42*	--	.03	-.07	-.07	-.12	-.07	-.11	-.12	-.39	-.16	-.09	.06	.58*	.25*	-.08	.06	-.10	.06	.05	-.10	.04	-.11	-.05	-.15	.03	-.11	.03
4.Alc_int	.06	.38*	.73*	--	.09	.01	-.03	.13	-.02	.06	-.15	-.03	.00	-.17*	.46	.06	-.08	-.12	.07	.07	.03	-.04	-.07	-.04	.04	.01	.14	.06	.03
5.PA_frq	-.09	.01	.19	.22	--	.38*	.38	.13	.00	.04	.25	-.03	.19*	.08	.14	-.01	.34*	.15	.38*	.20*	-.01	.18*	.21*	.34*	.39*	.11	.36*	.03	.18*
6.HE_frq	.19	-.25*	-.33*	-.35*	.12	--	.45	-.18*	-.09	-.02	.44	.08	.20*	.28*	.28	.01	.12	.25*	.33*	.03	-.06	.09	.23*	.21*	.26*	.22*	.28*	.08	.13
7.Smk_ctrl	-.16	.05	.00	.17	.35	.13	--	.06	-.14	-.40	.21	-.14	-.28	-.26	.06	-.01	-.13	-.05	.27	.47	.01	-.25	-.09	-.09	.14	.46	.41	-.21	.23
8.Alc_ctrl	-.12	.08	.08	.13	-.02	-.09	.59*	--	.41*	.43*	-.40	.01	.19*	.05	-.69*	.10	.12	-.07	.09	.08	-.10	.05	.06	.05	.03	-.09	-.13	-.08	-.10
9.PA_ctrl	-.46	.21	.14	.24	.00	-.14	.58*	.51*	--	.65*	-.24	.08	.17*	.07	-.32	.16	-.11	.06	-.07	.05	-.02	-.04	.04	.09	-.05	-.07	-.25*	-.16	-.15
10.HE_ctrl	-.10	.08	.08	.12	.02	-.06	.15	.40*	.58*	--	-.25	-.09	.18*	.06	-.44	.11	-.02	-.11	.08	.04	-.17*	.01	.01	.06	-.04	-.06	-.20*	-.08	-.05
11.Smk_aut	.33	.41	.25	.43	.05	.23	.57*	.32	.28	-.32	--	.10	-.49	-.29	.25	-.15	.30	.02	.09	.29	.13	.36	-.11	.40	.25	.40	.23	.46	.23
12.Alc_aut	.30	.17	.17	.23	.17	.-.04	.47	.13	.19	-.11	.54*	--	.14	.26*	-.04	-.04	-.07	.20*	-.06	-.06	.10	.07	.03	-.01	-.04	.10	.03	-.04	.15
13.PA_aut	-.13	.08	.08	.17	.08	.12	.46	.23	.03	-.03	.23	.30*	--	.60*	-.04	.14	.34*	.24*	.31*	.14	-.03	.16	.12	.35*	.17*	.07	.02	-.06	.11
14.HE_aut	.55*	.11	-.15	.02	.21	.20	.38	.33*	.04	.00	.37	.40*	.37*	--	.01	.09	.19*	.44*	.18*	.00	-.01	.13	.09	.23*	.08	.02	-.03	.05	.12
15.Smk_intr	.62*	.44	.32	-.13	.01	.04	-.36	-.43	-.41	.03	-.25	.10	-.01	.09	--	.30	-.14	.25	-.22	.16	.38	.40	.16	.10	.09	-.13	.12	.28	.36
16.Alc_intr	.41	.46*	.36*	.46*	.16	.08	.10	.09	.33*	.18	.18	.14	.24	.14	.52	--	-.02	.02	-.02	.04	.04	-.04	.05	.08	.07	-.12	.06	.18*	.00
17.PA_intr	.20	-.02	.16	-.01	.31*	-.09	-.06	-.14	-.33*	-.28*	-.12	.22	.28*	.23	.61*	-.09	--	.21*	.26*	.09	.12	.30*	.16*	.26*	.30*	.10	.25*	.09	.27*
18.HE_intr	.27	-.05	.09	.15	.28*	.08	.36	-.06	-.09	-.08	.37	.38*	.09	.35*	.14	.12	.31*	--	.10	-.01	-.02	.11	.27*	.23*	.10	18*	.18*	.09	.11

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
19.HA_imp	-.18	.02	.08	.21	.37*	.16	.22	.22	.06	.10	.28	.00	.14	.22	-.18	.27	.05	.20	--	.19*	.06	.13	.25*	.33*	.41*	.06	.35*	.12	.10
20.HA_bhvr	.04	.03	-.08	-.09	-.03	.12	.29	-.09	-.13	-.25*	.57*	.28*	-.10	.29*	-.22	-.07	.13	.02	.28*	--	.10	.07	.11	.15	.08	.05	.09	.08	.16*
21.HA_resp	.14	.08	.22	.20	-.03	-.06	-.33	.08	.03	.09	-.14	-.06	-.08	..07	.18	.19	-.03	-.15	.15	.17	--	.17*	.14	.12	.17*	.09	.13	.16*	.12
22.HA_typ	-.06	-.07	.06	.05	-.12	.01	-.26	-.13	-.09	-.15	-.22	-.04	-.02	.02	.43	-.24	.09	.02	.11	.21	.15	--	.16*	.26*	.30*	.16*	.24*	.14	.26*
23.HPs	-.26	-.03	-.09	.13	-.35*	.16	.40	.04	.07	-.20	.18	.02	-.01	.00	-.27	.26	.04	.13	.24*	-.08	-.07	.10	--	.39*	.51*	.37*	.34*	.20*	.21*
24.PHE	-.20	-.01	-.12	-.07	.19	.09	-.14	-.30*	-.19	-.36*	.25	.10	.21	.13	-.11	.13	.30*	.03	.13	.25*	.01	.29*	.28*	--	.32*	.15	.42*	.27*	.28*
25.HSt	-.50*	-.10	-.11	-.01	.38*	.17	.30	.01	.14	-.24	-.07	.07	.20	.08	-.24	.11	.19	.21	.31*	-.04	-.25*	.18	.68*	.46*	--	.25*	.38*	20*	.26*
26.PhysS	-.44	-.32*	-.26	-.06	.29*	.18	.07	-.01	-.06	-.06	-.15	-.22	-.04	.00	-.16	-.09	.09	-.02	.37*	.04	-.02	.24*	.49*	.12	.48*	--	.36*	.16*	.22*
27.PWB	.11	.02	.06	.04	.07	.25*	-.07	-.16	-.07	-.30*	.41	.01	.09	.11	-.12	.09	.07	.14	.02	-.01	-.04	.21	.32*	.43*	.31*	.17	--	.46*	.43*
28.BPNS_pr	.22	-.19	-.18	.02	-.01	.05	-.22	-.34*	.02	-.07	.36	.16	-.13	-.02	-.14	-.11	.05	.19	-.12	.02	.02	.16	.29*	.41*	.28*	.20	.50*	--	.19*
29.BPNS_fr	.31	-.08	.19	.08	-.10	.17	-.40	-.32*	-.21	-.29*	.05	.13	.14	.05	.36	.15	.03	.06	.01	.05	.03	.11	.07	.26*	.02	-.06	.45*	.20	--

Note. Correlations for females are above the diagonal; correlations for males are below. Sample size for females is 167, and for males, 71.

*$p < 0.05$.

Smk_frq= Smoking frequency, Alc_frq=Alcohol frequency, PA_frq=Physical activity frequency, HE_frq=Healthy eating frequency, Scale: 1=0 days (during the past 30 days), 7=26-30 days.

Smk_int=Smoking intensity; Scale: 1= I have not smoked at all (during the past 30 days), 7= More than 25 cigarettes per day.

Alc_int=Alcohol intensity, Scale: 1= 0 days (had 5 or more drinks in a row during the past 30 days), 7= 20 or more days.

Smk_ctrl=Controlled motivation for smoking, Alc_ctrl = Controlled motivation for alcohol drinking, PA_ctrl= Controlled motivation for physical activity, HE_ctrl= Controlled motivation for healthy eating, Smk_aut=Autonomous motivation for smoking, Alc_aut= Autonomous motivation for alcohol drinking, PA_aut= Autonomous motivation for physical activity, HE_aut=Autonomous motivation for healthy eating, Smk_intr=Intrinsic motivation for smoking, Alc_intr= Intrinsic motivation for alcohol drinking, PA_intr= Intrinsic motivation for physical activity, HE_intr=Intrinsic motivation for healthy eating, Scale: 1=Not at all because of this reason, 5=Completely because of this reason.

HA_imp=Importance of health, Scale: 1=Not important at all, 7=Very important.
HA_bhvr=People's health depends on their behaviour, Scale: 1=Does not depend at all, 7=Depends entirely.
HA_resp=People's responsibility for their health, Scale: 1=Not responsible, 7=Responsible.
HA_typ=Typicality of healthy lifestyle, Scale: 1=Very Unusual, 7=Very typical.
HPs=Health perceptions, Scale: 1=Strongly Disagree, 7=Strongly Agree.
PHE= Psychological health empowerment, Scale: 1=Strongly Disagree, 7=Strongly Agree.
HSt=Health status, Scale: 1=Very poor, 7=Very good.
PhysS=Physical symptoms Scale: 1=0 days, 7=21-30 days
PWB=Psychological well-being, Scale: 1=Strongly Disagree, 7=Strongly Agree.
BPNS_pr=Basic psychological needs support by parents, 1=Strongly Disagree, 7=Strongly Agree.
BPNS_fr= Basic psychological needs support by friends, 1=Strongly Disagree, 7=Strongly Agree.

Table 3-3. Means, Standard Deviations of Means, Skewness, and Kurtosis for All Scale Variables by Gender (N=238)

Variables	n		Mean		Standard Deviation		Skewness		Kurtosis	
	M	W	M	W	M	W	M	W	M	W
1.Smk_frq	16	15	4.75	4.47	2.18	1.92	-.17	.20	-1.9	-1.43
2.Smk_int	15	13	2.27	2.23	.46	.44	1.18	1.45	-.73	.10
3.Alc_frq	51	133	2.86	2.48	.80	.68	.50	1.38	-.55	1.74
4.Alc_int	44	97	3.75	3.31	1.24	1.09	.27	.43	-.73	-.55
5.PA_frq	66	153	3.80	3.58	1.55	1.55	.38	.38	-.80	-.99
6.HE_frq	70	167	5.06	5.38	1.20	.97	-.52	-.46	-.71	-.19
7.Smk_ctrl	16	15	1.72	1.83	.82	1.06	.65	1.53	-.63	1.63
8.Alc_ctrl	51	133	1.86	1.77	.90	.77	1.33	.87	1.90	.17
9.PA_ctrl	66	153	2.00	2.34	.96	1.01	.71	.47	-.04	-.43
10.HE_ctrl	69	167	1.94	2.37	1.01	1.08	.91	.57	.03	-.35
11.Smk_aut	16	15	1.69	2.17	.87	1.44	1.40	.95	.1.76	-.64
12.Alc_aut	51	133	1.95	1.68	.84	.67	.59	.70	.15	-.10
13.PA_aut	66	153	4.02	4.03	1.05	.92	-1.16	-1.05	.88	1.30
14.HE_aut	69	167	4.05	4.04	.92	.89	-.60	-.92	-.84	.73
15.Smk_intr	16	15	3.44	2.93	1.03	1.44	-1.06	-.03	.78	-1.51
16.Alc_intr	51	133	3.96	3.91	1.02	.83	-1.22	-.80	1.45	.84
17.PA_intr	66	153	3.92	3.73	1.04	1.08	-.60	-.73	-.46	.06
18.HE_intr	69	167	2.57	2.75	1.39	1.32	.422	.25	-1.51	-1.04
19.HA_imp	71	167	6.18	6.37	.88	.82	-1.14	-1.55	1.50	3.91
20.HA_bhvr	71	167	5.15	5.37	1.05	.94	-.24	-.14	.49	.19
21.HA_resp	71	167	5.92	5.78	1.11	1.01	-.81	-.45	-.16	-.44
22.HA_typ	71	167	3.90	4.16	1.12	1.11	.32	.01	.39	.26
23.HPs	71	167	4.84	4.76	1.11	1.00	-.47	-.08	.04	-.50
24.PHE	71	167	5.87	5.94	.78	.54	-2.26	-.40	9.26	-.31

Variables	n		Mean		Standard Deviation		Skewness		Kurtosis	
	M	W	M	W	M	W	M	W	M	W
25.HSt	71	167	5.49	5.43	1.15	1.07	-1.01	-.86	.73	1.05
26.PhysS	71	167	5.83	5.78	.78	.69	-2.01	-.65	6.79	-.15
27.PWB	71	167	5.42	5.47	.59	.58	-.57	-.44	.01	.08
28.BPNS_pr	71	167	5.51	5.57	.93	.83	-1.41	-.85	2.92	.31
29.BPNS_fr	71	167	5.47	5.70	.74	.68	-.91	-.43	.79	.34

Note. All descriptive statistics are provided for men (M) and women(W) in the sample.
Smk_frq= Smoking frequency, Alc_frq=Alcohol frequency, PA_frq=Physical activity frequency, HE_frq=Healthy eating frequency, Scale: 1=0 days (during the past 30 days), 7=26-30 days.
Smk_int=Smoking intensity; Scale: 1= I have not smoked at all (during the past 30 days), 7= More than 25 cigarettes per day.
Alc_int=Alcohol intensity, Scale: 1= 0 days (had 5 or more drinks in a row during the past 30 days), 7= 20 or more days.
Smk_ctrl=Controlled motivation for smoking, Alc_ctrl = Controlled motivation for alcohol drinking, PA_ctrl= Controlled motivation for physical activity, HE_ctrl= Controlled motivation for healthy eating, Smk_aut=Autonomous motivation for smoking, Alc_aut= Autonomous motivation for alcohol drinking, PA_aut= Autonomous motivation for physical activity, HE_aut=Autonomous motivation for healthy eating, Smk_intr=Intrinsic motivation for smoking, Alc_intr= Intrinsic motivation for alcohol drinking, PA_intr= Intrinsic motivation for physical activity, HE_intr=Intrinsic motivation for healthy eating, Scale: 1=Not at all because of this reason, 5=Completely because of this reason.
HA_imp=Importance of health, Scale: 1=Not important at all, 7=Very important.
HA_bhvr=People's health depends on their behaviour, Scale: 1=Does not depend at all, 7=Depends entirely.
HA_resp=People's responsibility for their health, Scale: 1=Not responsible, 7=Responsible.
HA_typ=Typicality of healthy lifestyle, Scale: 1=Very Unusual, 7=Very typical.
HPs=Health perceptions, Scale: 1=Strongly Disagree, 7=Strongly Agree.
PHE= Psychological health empowerment, Scale: 1=Strongly Disagree, 7=Strongly Agree.
HSt=Health status, Scale: 1=Very poor, 7=Very good.
PhysS=Physical symptoms Scale: 1=0 days, 7=21-30 days
PWB=Psychological well-being, Scale: 1=Strongly Disagree, 7=Strongly Agree.
BPNS_pr=Basic psychological needs support by parents, 1=Strongly Disagree, 7=Strongly Agree.
BPNS_fr= Basic psychological needs support by friends, 1=Strongly Disagree, 7=Strongly Agree.

To check if combining two groups (men and women) is justifiable in further analyses, a series of independent t-tests was conducted based on gender. Comparisons of mean levels between men and women were made for 25 scale variables[6]. After Bonferroni correction was applied (.05/25=.002), the respondents were found to be significantly different by gender only for the frequency of alcohol drinking, $t(182)= 3.236$, $p=.001$, $SE=.12$, where men scored higher than women. Because there were so few differences, data were collapsed across gender for most of the analyses, except hierarchical multiple regression analyses, where gender was controlled for in the analysis for alcohol drinking frequency. Also, the correlation analysis of relations between sociodemographic variables and the health variables indicated that the frequency of physical activity had a tendency to increase with income, $r\ (219)=.14$, $p = .041$. To control for its possible influence, an income variable was entered as a constant for the regression analysis involving physical activity.

Finally, principal components analysis was used to reduce the number of cognitive factors to be entered into multiple regression analyses. Since the variables (four health attitudes variables, health perceptions scale, and health empowerment scale) were related, an oblimin rotation was applied, and a simple structure of two components (health perceptions of self and health perceptions of others), explaining 48% of the variance, was achieved after 7 iterations (Table 3-4). Composite scores were created for each of two components, based on the mean of the variables which had their primary loadings on each component.

[6] After principle components analysis was applied to cognitive variables (health attitudes, health perceptions and health empowerment scales), their number was reduced from 6 to 2 components.

Table 3-4. Component loadings and communalities based on a principle components analysis with oblimin rotation for 6 cognitive scales (N = 238)

Scale variables	Component 1 Health perceptions of self	Component 2 Health perceptions of others	Communality
PHE	.81		.58
HPs	.73		.61
HA_imp	.56		.39
HA_resp		.77	.57
HA_bhvr		.61	.40
HA_typ		.47	.35

Note. Component loadings from the pattern matrix are reported.
HA_imp=Importance of health, Scale: 1=Not important at all, 7=Very important.
HA_bhvr=People's health depends on their behaviour, Scale: 1=Does not depend at all, 7=Depends entirely.
HA_resp=People's responsibility for their health, Scale: 1=Not responsible, 7=Responsible.
HA_typ=Typicality of healthy lifestyle, Scale: 1=Very Unusual, 7=Very typical.
HPs=Health perceptions, Scale: 1=Strongly Disagree, 7=Strongly Agree.
PHE= Psychological health empowerment, Scale: 1=Strongly Disagree, 7=Strongly Agree.

Research Question 1

The majority of the sample (97.1%, n=231) reported currently practicing two to four health behaviours. Their coexistence was reflected in the multiple health behavior co-occurrence index, the frequency analysis of which is presented in Table 3-5. Seven multiple health behavior clusters were singled out. The most frequent cluster in the sample was co-occurrence of alcohol drinking, physical activity, and healthy eating (62.2%). It was followed by a combination of two health-maintenance behaviours (16.4%) and a combination of all four behaviours (11.8%).

Table 3-5. Multiple health behaviours co-occurrence (N = 231)

Clusters	n	%	Mean	SD
1. Alcohol Drinking + Physical Activity + Healthy Eating	148	62.2		
Alc_frq	143		2.49	.64
Alc_int	105		3.25	1.02
PA_frq	148		3.75	1.48
HE_frq	148		5.31	1.02
2. Physical Activity + Healthy Eating	39	16.4		
PA_frq	39		3.56	1.84

Clusters	n	%	Mean	SD
HE_frq	39		5.46	.99
3. Smoking + Alcohol Drinking + Physical Activity + Healthy Eating	28	11.8		
Smk_frq	28		4.64	2.02
Smk_int	25		2.28	.46
Alc_frq	27		3.19	.96
Alc_int	26		4.19	1.32
PA_frq	28		3.48	1.43
HE_frq	28		5.13	1.21
4. Alcohol Drinking + Healthy Eating	12	5.2		
Alc_frq	12		2.42	.67
Alc_int	9		3.56	1.42
HE_frq	13		5.15	.88
5. Smoking + Physical Activity + Healthy Eating	2	0.8		
Smk_frq	2		5.50	2.12
Smk_int	2		2.00	.00
PA_frq	2		1.50	.00
HE_frq	2		4.50	2.12
6. Smoking + Alcohol Drinking + Healthy Eating	1	0.4		
Smk_frq	1		2.00	
Smk_int	1		2.00	
Alc_frq	1		3.00	
Alc_int	1		4.00	
HE_frq	1		2.50	
7. Alcohol Drinking + Physical Activity	1	0.4		
Alc_frq	1		2	
PA_frq	1		1.5	

Note. The groups reflect the frequencies of multiple health behaviour co-occurrence and do not overlap.

Percentages refer to N=231. Percentages that do not total 100% are due to missing values.

Means (M) and standard deviations (SD) are reported for smoking, alcohol drinking, physical activity, and healthy eating within each subgroup (e.g., for those who combine alcohol drinking with physical activity and healthy eating). Original values are reported in clusters 6 and 7.

Smk_frq= Smoking frequency, Scale: 1=0 days (during the past 30 days), 7=26-30 days.

Smk_int=Smoking intensity; Scale: 1= I have not smoked at all (during the past 30 days), 7= More than 25 cigarettes per day.

Alc_frq=Alcohol frequency, Scale: 1=0 days (during the past 30 days), 7=26-30 days.
Alc_int=Alcohol intensity, Scale: 1= 0 days (had 5 or more drinks in a row during the past 30 days), 7= 20 or more days.
PA_frq=Physical activity frequency, Scale: 1=0 days (during the past 30 days), 7=26-30 days.
HE_frq=Healthy eating frequency, Scale: 1=0 days (during the past 30 days), 7=26-30 days.

Comparisons of the means based on the clusters[7], suggested some important differences. The presence of both smoking and alcohol drinking seemed to encourage the frequency and intensity of both behaviours in the respondents, compared to the presence of alcohol only. 'Smoking+alcohol drinking+ physical activity+healthy eating' was significantly different from 'alcohol drinking+physical activity+healthy eating' cluster on the intensity of alcohol drinking, $t(129)= 3.978$, $p<.001$, $SE=.24$, and on the frequency of alcohol drinking, $t(168)= 4.751$, $p=.001$, $SE=.15$. Another interesting finding was that the absence of the physical activity from the cluster ('alcohol drinking+physical activity+healthy eating' were compared with 'alcohol drinking+healthy eating') was associated with the lower health empowerment, $t(159)= -2.864$, $p=.005$, $SE=.18$, and lower self-reported health status, $t(159)= -3.514$, $p=.001$, $SE=.30$.

At the level of motivations, the relations among health behaviours within the first four clusters followed the same tendencies. Controlled and autonomous motivations were positively correlated across alcohol drinking, physical activity, and healthy eating, whereas with intrinsic motivations, such relations were not found. For example, in the biggest cluster of 'alcohol drinking+physical activity+healthy eating', controlled motivations were related between alcohol drinking and physical activity, $r(143)=.40$, $p<.001$, alcohol drinking and healthy eating, $r(143)=.44$, $p<.001$, physical activity and healthy eating, $r(148)=.73$, $p<.001$. Likewise, corresponding autonomous motivations were linked for alcohol drinking and physical activity, $r(143)=.24$, $p=.005$, physical activity and healthy eating, $r(148)=.57$, $p<.001$.

[7] Six independent t-tests were conducted and the following Bonferroni correction was applied: $p \leq .05/6 \leq .008$.

One of the possible explanations for such positive relations among motivations for seemingly contradictory behaviours, such as alcohol drinking and physical activity, could be a common source of regulation for them. For example, if a participant's eating habits were under the influence of his family and friends, the latter could define their drinking habits as well, or a participant's self-control could regulate the frequency of his/her engagement in both alcohol drinking and physical activity. However, it is the limit of the variable-based approach that explanations, especially at the individual level, cannot be made. Averaged data and sample-based covariances can indicate relations among the variables but cannot even differentiate between necessary and accidental ones, left alone answer the question about how they coexist.

Research Question 2

The preliminary analysis of Pearson intercorrelations, supported by the previous findings in the field, was suggestive of motivations, cognitive perceptions, and social contextual influences to be important and interrelated components in the regulation mechanisms of smoking, alcohol drinking, physical activity, and healthy eating (Table 3-2). For example, in alcohol drinking, negative associations were found between controlled motivation and support on the part of parents and friends, meaning that respondents were more likely to be engaged in drinking because of external pressure or seeking approval from others, if their basic psychological needs were not satisfied by their parents and friends. Otherwise, autonomous and intrinsic motivations for physical activity positively correlated with health cognitions (such as health empowerment), health outcomes (such as physical health), and the frequency of physical activity in both men and women, implying that the more the participants believed in the importance of health and felt empowered regarding their health, the more autonomously and

intrinsically motivated they were for physical activity and the more frequent their physical activity became.

Although all motivations within health behaviours are interrelated, the study of their correlations with the corresponding health behaviour suggested that they might have a hierarchical structure, and one type of motivation could be the best predictor of the behaviour. To check this assumption, hierarchical multiple regressions analyses were conducted. Relevant sociodemographic variables (gender for alcohol drinking and income for physical activity) were controlled for as covariates and motivations were entered from the strongest to the weakest, depending on how they correlated with their corresponding health behaviour (see Table 3-2 for the correlations). The results of the multiple regression analysis with motivations predicting frequency of alcohol drinking, physical activity, and healthy eating on the sample (N=238) are presented in Table 3-6. The results of the analysis were not significant for smoking (frequency and intensity) and the intensity of alcohol drinking; therefore, they are not reported here. The small size of the sub-sample (n=31) could explain such results for smoking; however, it could not be the factor for alcohol intensity (n=183). The most plausible explanations could be that either the intensity of alcohol drinking was regulated by factors other than motivations, or that the regulation mechanisms were different for men versus women, despite the fact that no differences were found between men and women on the intensity of drinking variable in the sample during preliminary analyses.

Table 3-6. Hierarchical regression analysis with motivations predicting frequency of health behaviours (N=238)

Predictor	Criterion	R^2	*SEE*	F_{change}	*df*	*ρ*	β	*t*	*ρ*	*sr*
	Alcohol Drinking									
Gender		.05	.72	10.48	1,182	.001*	-.24	-3.35	.001*	-.23
Intrinsic		.13	.69	16.66	1,181	<.001*	.29	4.12	<.001*	.29
Controlled		.14	.69	.40	1,180	.527	-.04	-.60	.549	-.04
Autonomous		.14	.69	.43	1,179	.512	-.05	-.66	.512	-.05
	Physical Activity									
Income		.02	1.54	4.24	1,217	.041*	.12	1.85	.065	.12
Intrinsic		.13	1.46	26.43	1,216	<.001*	.32	4.64	<.001*	.30
Autonomous		.13	1.46	.43	1,215	.513	.04	.54	.591	.03
Controlled		.13	1.46	.30	1,214	.586	.55	.55	.586	.04
	Healthy Eating									
Autonomous		.06	1.02	15.59	1,234	<.001*	.24	2.95	.004*	.19
Intrinsic		.07	1.01	2.50	1,233	.116	.09	1.55	.122	.10
Controlled		.07	1.01	.01	1,232	.914	-.01	-.11	.914	-.01

Note. Gender is controlled for in Alcohol Drinking, and Income is controlled for in Physical Activity.
** $p < 0.05$*.
SEE=Standard Error of the Estimate
sr=semi-partial correlation
R^2 shows the percentage of variance in the criterion variable that the model explains; sr^2 shows the percentage of variance that the predictor uniquely explains in the model (its unique input into R^2).

As expected, the results showed that one type of motivation could account best for the variance in the frequency of the corresponding behaviour. Regarding alcohol drinking, intrinsic motivation was the only significant predictor and uniquely accounted for 8% of the variance in alcohol drinking behaviour. Likewise with physical activity, intrinsic motivation accounted for 9% of the variance. Finally, only autonomous motivation could account for 4% of variation in healthy eating. However, the variance explained by the leading motivations and overall motivational models was small (7%-14%), suggesting that other regulations (e.g., cognitive and social contextual) alongside motivations might be important in the regulation mechanism.

To explore this possibility, a hierarchical multiple regression analysis was conducted, in which factors were entered in the following blocks: cognitive perceptions (two variables), social context (two variables), health outcomes (three variables), and motivation (one variable). Only the leading motivation for each health behavior was entered into the equation to see if they could still be good predictors of the corresponding health behaviours. Relevant sociodemographic variables (gender for alcohol drinking and income for physical activity) were controlled for as covariates. The results of this multiple regression analysis are presented in Table 3-7. Again, the results of the analysis were not significant for the intensity of alcohol drinking and are not reported here, suggesting that regulation mechanisms of the intensity of health behaviours might be different from those of the frequency of the behavior.

Table 3-7. Hierarchical regression analysis with cognitions, social context, health outcomes, and motivation, predicting frequency of alcohol drinking, physical activity, and healthy eating in the sample (N=238)

Step and predictor variable	Criterion	R^2	*SEE*	F_{change}	*df*	*ρ*	β	*t*	*ρ*	*sr*
	Alcohol Drinking									
Step 1:		.05	.72	10.48	1,182	.001*				
Gender							-.27	-3.94	<.001*	-.27
Step 2:		.07	.72	1.01	2,180	.367				
Health Cognitions										
Component 1							-.14	-1.51	.132	-.10
Component 2							.04	.59	.559	-.04
Step 3:		.09	.71	.2.84	2,178	.061				
Social context										
Parents							-.20	-2.70	.008*	-.18
Friends							.11	1.42	.159	.10
Step 4:		.13	.70	.2.67	3,175	.049				
Health Outcomes										
Health Status							-.04	-.49	.624	-.03
Physical Symptoms							-.13	-1.78	.078	-.12
PWB							.17	1.85	.066	.13
Step 5:		.21	.67	17.502	1,174	<.001*				
Health Motivations										
Intrinsic							.29	4.18	<.001*	.28
Intercept	2.66									
Total R^2	.17									
	Physical Activity									
Step 1:		.02	1.54	4.24	1,217	.041*				
Income							.08	1.35	.178	.08
Step 2:		.17	1.43	18.75	2,215	<.001*				
Health Cognitions										
Component 1							.20	2.48	.014*	.15
Component 2							.01	.12	.903	.01
Step 3:		.18	1.43	1.30	2,21	.274				

Step and predictor variable	Criterion	R^2	*SEE*	F_{change}	*df*	*ρ*	β	*t*	*ρ*	*sr*
Social Context										
Parents							-.16	-2.53	.017*	-.14
Friends							-.07	-1.12	.265	-.07
Step 4:		.23	1.39	5.09	3,210	.002*				
Health Outcomes										
Health Status							.19	2.52	.012*	.15
Physical Symptoms							-.02	-.37	.716	-.02
PWB							.17	2.07	.040*	.12
Step 5:		.27	1.35	11.77	1,209	.001*				
Health Motivations										
Intrinsic							.22	3.43	.001*	.20
Intercept	.91									
Total R^2	.24									
	Healthy Eating									
Step 1:		.09	1.00	11.12	2,233	<.001*				
Health Cognitions										
Component 1							.14	1.59	.114	.10
Component 2							-.05	-.77	.440	-.05
Step 2:		.10	1.00	1.21	2,231	.301				
Social Context										
Parents							-.09	-1.32	.188	-.08
Friends							.03	.47	.643	.03
Step 3:		.12	1.00	2.21	3,228	.088				
Health Outcomes										
Health Status							.03	.47	.748	.02
Physical Symptoms							.09	-1.26	.189	.08
PWB							.20	2.50	.013*	.15
Step 4:		.17	.99	12.61	1,227	<.001*				
Health Motivations										
Autonomous							.22	3.55	<.001*	.22
Intercept	1.75									

Step and predictor variable	Criterion	R^2	*SEE*	F_{change}	*df*	ρ	β	*t*	ρ	*sr*
Total R^2	.14									

Note. Income was significant only when first entered into the model for physical activity. Health cognitions were significant only when first entered into the model for healthy eating.

*$p < 0.05$.

SEE=Standard Error of the Estimate

sr=semi-partial correlation

R^2 shows the percentage of variance in the criterion variable that the model explains; sr^2 shows the percentage of variance that the predictor uniquely explains in the model (its unique input into R^2).

Component 1=Cognitive perceptions of self

Component 2=Cognitive perceptions of others

PWB=Psychological Well-being

Total R^2=Adjusted R^2

The results confirmed that motivations were still the best predictors among the variables entered, except for alcohol drinking where gender and intrinsic motivation were uniquely accounting for 7.2 and 7.8% of the variance in alcohol drinking behaviour. As for physical activity, intrinsic motivation accounted for 4% of the variance, and cognitions of self (2.3%), health status (2.3%), and psychological well-being (1.4%) were marginally important. Autonomous motivation accounted for 4.8% of variation in healthy eating and was supported by psychological well-being factor (1.7%) in the model. However, the total variance explained by the models was still small (14%-24%), encouraging further investigations into the factors related to the regulation mechanisms of alcohol drinking, physical activity, and healthy eating.

To investigate if the general abstract regularities found for each health behaviour in the sample would still reflect within the regulation mechanisms of multiple health behaviours, a multiple regression analysis with the same motivational, cognitive, health outcomes and social contextual variables was done on two clusters of seemingly contradictory behaviours: 'alcohol drinking+physical activity+healthy eating', n=148, and 'smoking+alcohol drinking+physical activity+healthy eating', n=28. Gender was controlled for as a covariate in alcohol drinking and other factors were entered in the same blocks: cognitive perceptions (two variables), social context (two variables), health outcomes (three variables), and motivation (one variable). Again, due to the small size of the cluster, there were no significant findings for 'smoking+alcohol drinking+physical activity+healthy eating' cluster. Hence, only the results of hierarchical multiple regression analysis for 'alcohol drinking+physical activity+healthy eating' are reported in the table below (Table 3-8).

Table 3-8. Hierarchical regression analysis with motivations, cognitions, social context, and health outcomes predicting frequency of alcohol drinking, physical activity, and healthy eating in 'alchol drinking+physical activity+healthy eating' cluster (n=148)

Step and predictor variable	Criterion	R^2	*SEE*	F_{change}	*df*	*ρ*	β	*t*	*ρ*	*sr*
	Alcohol Drinking									
Step 1:		.03	.63	3.91	1,141	.050*				
Gender							-.24	-2.75	.007*	-.23
Step 2:		.05	.63	1.29	2,139	.278				
Health Cognitions										
Component 1							-.15	-1.33	.188	-.11
Component 2							-.02	-.25	.801	-.02
Step 3:		.05	.63	.56	2,137	.575				
Social context										
Parents							-.13	-1.36	.176	-.11
Friends							.07	.76	.448	.06
Step 4:		.07	.63	.81	3,134	.492				
Health Outcomes										
Health Status							-.08	-.68	.496	-.06
Physical Symptoms							-.09	-.95	.364	-.08
PWB							.13	1.16	.248	.10
Step 5:		.11	.62	6.05	1,133	.015*				
Health Motivations										
Intrinsic							.21	2.46	.015*	.20
Intercept	2.68									
Total R^2	.05									
	Physical Activity									
Step 1:		.01	1.48	1.14	1,146	.287				
Income							.03	.44	.665	.03
Step 2:		.17	1.37	13.70	1,144	<.001*				
Health Cognitions										
Component 1							.23	2.27	.025*	.17
Component 2							-.03	-.41	.682	-.03
Step 3:		.18	1.37	.86	2,142	.426				

Step and predictor variable	Criterion	R^2	*SEE*	F_{change}	*df*	*ρ*	β	*t*	*ρ*	*sr*
Social Context										
Parents							-.11	-1.27	.206	-.09
Friends							-.04	-.41	.683	-.03
Step 4:		.22	1.34	2.71	3,139	.047*				
Health Outcomes										
Health Status							.25	2.55	.012*	.19
Physical Symptoms							-.09	-1.07	.289	-.08
PWB							.09	.88	.381	.07
Step 5:		.25	1.32	5.22	1,138	.024*				
Health Motivations										
Intrinsic							.18	2.29	.024*	.17
Intercept	1.92									
Total R^2	.20									
	Healthy Eating									
Step 1:		.16	.95	13.37	2,145	<.001*				
Health Cognitions										
Component 1							.15	1.42	.158	.10
Component 2							-.11	-1.38	.169	-.10
Step 2:		.16	.95	.28	2,143	.756				
Social Context										
Parents							-.12	-1.42	.157	-.10
Friends							-.04	-.42	.673	-.03
Step 3:		.19	.94	1.62	3,140	.189				
Health Outcomes										
Health Status							.11	1.12	.265	.08
Physical Symptoms							.09	1.13	.262	.08
PWB							.21	2.01	.046*	.15
Step 4:		.25	.91	11.68	1,139	.001*				
Health Motivations										
Autonomous							.28	3.42	.001*	.25
Intercept	-6.56									

Step and predictor variable	Criterion	R^2	*SEE*	F_{change}	*df*	*ρ*	β	*t*	*ρ*	*sr*
Total R^2	.20									

Note. Health cognitions were significant only when first entered into the model for healthy eating.
*$p < 0.05$.
SEE=Standard Error of the Estimate
sr=semi-partial correlation
R^2 shows the percentage of variance in the criterion variable that the model explains; sr^2 shows the percentage of variance that the predictor uniquely explains in the model (its unique input into R^2).
Component 1=Cognitive perceptions of self
Component 2=Cognitive perceptions of others
PWB=Psychological Well-being
Total R^2=Adjusted R^2

The results indicated that motivations were still important predictors. However, in the context of the regulation mechanism of multiple health behaviours, gender, and intrinsic motivations could explain less variance (5.3% and 4%) in alcohol drinking Then, an interesting picture emerged for the physical activity within the cluster showing that the role of perceptions of self (including health empowerment) and health status increased (3.6% and 2.9%), while intrinsic motivation accounted for less variance (2.9%). These findings echo with the results from Research Question 1, which provided some evidence that the presence of physical activity in a cluster was related to an increase in health empowerment and other cognitions. Noteworthy, autonomous motivation accounted for more variance in the cluster (6.3%), suggesting that healthy eating might become more autonomously regulated in the presence of alcohol drinking.

In summary, hierarchical multiple regression analysis with motivations, cognitions, social context, and health outcomes predicting frequency of alcohol drinking, physical activity, and healthy eating in the sample and 'alcohol drinking+physical activity+healthy eating' cluster indicated some important regularities that might reflect the underlying regulation mechanisms of multiple health behaviours. In particular, the results confirmed that intrinsic and autonomous motivations could be the best predictors of the frequency of alcohol drinking, physical activity, and healthy eating in general and in the clusters of multiple health behaviours, such as alcohol drinking co-occurring with physical activity and healthy eating. Gender was found to be an important predictor, especially in the multiple health behaviour clusters. The supporting role of cognitions (e.g., health empowerment), health outcomes (e.g., psychological well-being), and social context (e.g., parents) was also recognized. However, it was acknowledged that the total variance explained by the models was relatively small implicating that further investigations into

the factors predicting and supporting health behaviours within those clusters is needed (Simantov, Schoen, & Klein, 2000).

Study 1 Discussion

In general, Study 1 is successful in describing the statistical associations behind the coexistence of smoking, alcohol drinking, physical activity, and healthy eating using variable-based approach. In accordance with the previous findings (Nademin, et al., 2010; Tucker & Irwin, 2011; Wells, 2013), health behaviours are found to co-occur in clusters, and health-risk behaviours can coexist with health-maintenance practices.

Most of the respondents in the sample (97.1%, n=231) testify simultaneous engagement in more than one health behaviour and the most frequent pattern is alcohol drinking, co-occurring with physical activity and healthy eating (62.2%, n=148). Within this cluster, the frequency and intensity of alcohol drinking is significantly lower compared to the cluster combining both smoking and alcohol drinking ('smoking+alcohol drinking+physical activity+healthy eating'). Another interesting result is that the absence of physical activity from the cluster ('alcohol drinking+physical activity+ healthy eating' was compared with 'alcohol drinking+healthy eating') is associated with the lower health empowerment and self-reported health. While the first result is in agreement with the previous reports about smoking and alcohol drinking supporting and promoting each other (Nichter, et al., 2010; Simantov, et al., 2000), the link between physical activity and health empowerment and their role in the regulation mechanisms of multiple health behaviour coexistence needs to be further investigated. Self-control is often reported as a requirement for successful training in sports (Thiel, et al., 2011).Alternatively, regular physical activity can promote perceptions of control, autonomy, and competence (Thøgersen-Ntoumani & Ntoumanis, 2006).

Health behaviours within clusters appear to be also related at the motivational level. For example, controlled and autonomous motivations are all linked across alcohol drinking, physical activity, and healthy eating. Although similar previous findings provide little explanation for such relations (Nigg, Lee, Hubbard, & Min-Sun, 2009), they might implicate that common regulation mechanisms underlie and can integrate seemingly contradictory behaviours. For example, if a participant's eating habits were under the influence of his family and friends, the latter could define his drinking habits as well. Otherwise, a participant's self-control could regulate the frequency of his/her engagement in both alcohol drinking and physical activity. Alternatively, some studies suggest that motivations can be related because they "spill over'' from one behavior to another. However, the research is not clear yet on what can trigger the process and within what kinds of health behaviour it can happen.

The current findings support the assumption, grounded in the previous literature research (Spring, Moller, & Coons, 2012), that motivation can be the centre of such hypothetical regulation mechanisms. The results of the hierarchical multiple regression analyses confirm that intrinsic and autonomous motivations are the best predictors of the frequency of alcohol drinking, physical activity, and healthy eating. Further analyses indicate that different types of motivations for the same health behaviour (controlled, autonomous, and intrinsic) are interrelated and can be arranged in a hierarchy (for example, intrinsic motivation is the strongest motivation for alcohol drinking and physical activity, and the autonomous component plays the same role in the motivational structure for healthy eating). These findings are in agreement with the SDT tenets about the hierarchical model of motivation (Vallerand & Rattelle, 2002), and the previous research suggesting that the development of such leading motivations (autonomous and intrinsic) can be beneficial for long-term versus short-term behaviour maintenance (Grund, 2013).

Cognitive (e.g., health empowerment) and social contextual (e.g., parents) factors are linked with the motivations in the regulation mechanisms of multiple health behaviours ('alcohol drinking+physical activity+healthy eating' cluster). However, the nature and directions of their influence are not explained yet: whether they shape motivations or can also define patterns of health behaviours, whether they influence directly or via other concepts, whether their influence is unidirectional or reciprocal. The present research provides little or contradictory evidence on the matter, thus suggesting that further investigation, probably using other than statistical methods, is needed.

In accordance with the previous findings (Quinn & Fromme, 2010; Wells, 2013), gender shows reliable associations and is an important predictor of the frequency of alcohol consumption. However, differences by socioeconomic status (income) or ethnic group are not found to be important for any of four health behaviours. The relative homogeneity of the sample can account for that, because most of the respondents are English speaking Canadians, whose family income is 41,000 and over.

Contrary to expected, no differences by gender or any significant predictors are found for the intensity of alcohol drinking. Binge drinking has been repeatedly recognized as a big problem among college student population (Kubacki, Siemieniako, & Rundle-Thiele, 2011; MacNeela & Bredin, 2011). However, despite the fact that more than half of the sample (59.2%) report binge drinking, no significant differences and few meaningful correlations are found in Study 1. As a related problem, no significant results are obtained for the frequency and intensity of smoking because the percentage of smokers in the sample is low (13%).

Strengths and Limitations

In summary, a variable-based approach provides reliable answers to the research questions. It provides evidence for the coexistence of health-risk and health-maintenance behaviours and describes the most frequent multiple health behaviour clusters. Also, it defines the best predictors and indicates statistical regularities among cognitive and social contextual variables related to four health behaviours and their motivations.

Minor limitations of Study 1 relate to the errors that may arise from the measures used and the characteristics of the sample studied. First limitation concerns the temporal scope of the survey and whether or not the findings represent the actual frequency and intensity of health behaviours beyond the time frame in question. Most of the questions about health behaviours were specific and bound to certain time periods (e.g., number of days out of the past 30 days the individual consumed alcohol or smoked). So the question arises whether, for instance, an individual's physical activity frequency in the past month represented the usual physical activity frequency.

Second, the response scale used to estimate some variables was subjective (response anchors like sometimes, always), to the effect that they might misreport and overestimate their healthiness almost unintentionally, just because they were not able to recall correctly.

The third limitation is that the current sample is relatively homogenous, as it is comprised of college students from the same geographic region with little difference in ethnic and socioeconomic background. At the same time, the sample is not proportionally representative of gender. Thus, the results from the current sample may not generalize well to more diverse or representative samples.

However, the major limitation of Study 1 is that the discovered associations have no explanatory power and important associations cannot be distinguished from the accidental ones. In particular, the statistical averaged data and sample-based covariances cannot explain how motivational, cognitive and social contextual factors can work and integrate behaviours at the level of an individual. The related limitation is that statistical analysis cannot go beyond confirming or disconfirming the existing knowledge. No new concepts can emerge, no additional information can be found. As a result, low percentages of explained variance (20% and lower) are typically reported in large health behaviour studies of adolescents and young adults (Galambos & Tilton-Weaver, 1998) indicating that some important factors are still not covered by the existing research.

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Chapter 4
STUDY 2

Study 2 was designed to overcome limitations of the variable-based approach used in Study 1 and sought to confirm and expand on the existing knowledge regarding multiple health behaviours and their regulations. Using a case-based approach, Study 2 explored the same research questions about multiple health behaviours coexistence and hypothetical mechanisms of regulation, focusing on but not limited to, examination of interviewees' motivations, cognitions, and social context of family and friends.

Interview data were recognized to be reflecting the participants' perceptions and understandings of how their health behaviours were occurring and related to each other. From the critical realism perspective, it was the concrete empirical level, at which the elements of the real underlying regulation mechanisms acquire their own unique and differentiating features, specific to the contexts of interviewees' lives. However, intensive comparative analysis based on retroduction, a complex iterative process of conceptual abstraction, theory-building, and empirical testing (Miles & Huberman, 1994; Reed, 2009), allows unifying individual differences. Thus, the relations across the participants were generalized, and some inferences could be made about the elements of the real underlying regulation mechanisms.

The logic of abstracting from the concrete and unifying after differentiating defined the choice of textual analyses. After preliminary analyses (engagement with the data and coding), within-case analysis focused on unique features of interviewees' multiple health behaviour coexistence and regulation (an analysis of one case, that best illustrates the within-case analysis, is included in the text of the manuscript, pp. 74-88) Then, between-case analysis unified individual findings and inferences were made on how alcohol drinking, physical activity, and healthy eating (or, smoking, alcohol drinking, physical activity, and healthy eating) could coexist

and be self-regulated in specific contingent contexts of university students. Importantly, those mechanisms were understood as context-specific and predictions or causal statements were done only about the effects they could produce in specific contexts and populations. Still, it was an improvement of Study 2 over Study 1 that the coexistence of multiple health behaviours was explained in detail and some insights into how they could be self-regulated within individuals were obtained.

Design and Method

Participants

The interviewees were purposefully selected to represent two clusters of multiple health behaviours: 'alcohol drinking+physical activity+healthy eating' and 'smoking+alcohol drinking+physical activity+healthy eating'. The purpose was to examine the same clusters that were the focus of Study 1 and to seek explanations on how they could coexist and be self-regulated within individuals. Thus, the selecting criteria were: simultaneous engagement in at least three health behaviours; and motivational scores average and above for most of those behaviours (see Table 3-3 for the mean scores).

Of 176 survey participants, who reported engagement in the two clusters, 65 provided their information and written consent to be contacted for the follow-up interviews (the first page of the survey in Appendix B). Invitations (Appendix E) were sent via e-mail, and two weeks later a reminder e-mail was sent to those who had not yet responded. There were 10 responses to the letter of invitation for a follow-up interview. Then, three of those 10 cancelled the meeting for personal reasons and one interview was not completed for technical reasons (and was not included in the analysis). Thus, six interviews were analysed. The detailed information on the interviewed participants is summarized in the table below (Table 4-1).

Table 4-1. Sociodemographic and relevant health data from the survey for six interviewees

	Alice	*Becky*	*Colton*	*Danny*	*Eva*	*Faith*
Gender	Female	Female	Male	Male	Female	Female
Age	18	26	22	20	19	19
Ethnicity	Euro-Canadian (English)	Aboriginal/ Metis	Euro-Canadian (English)	Euro-Canadian (English)	Other	Euro-Canadian (English)
Income	40,001-70,000	10,000-25,000	70,001-100,000	70,001-100,000	70,001-100,000	40,001-70,000
Smoking		Occasional Light			Occasional Light┼	
Controlled		1				
Autonomous		2.5*				
Intrinsic		1				
Alcohol drinking	Low-risk Social	Low-risk Binge	Low-risk Binge	Low-risk Binge	Low-risk Binge	Low-risk Binge
Controlled	1.5	2*	1.5	1.5	2*	1
Autonomous	1	2*	2.5*	1	2.5*	1
Intrinsic	4*	2	4*	4*	4*	4*
Physical activity	Moderate	Moderate	Moderate	High	Moderate	Moderate
Controlled	2.5*	1	1.5	1.5	3.5*	2.5*
Autonomous	2.5	4.5*	5*	5*	5*	3
Intrinsic	4*	4*	5*	5*	4*	4*
Healthy eating	Low	Moderate	High	Moderate	High	High
Controlled	2.5*	2.5*	1.5	2*	3*	2.5*
Autonomous	2.5	4.5*	4*	4*	5*	2
Intrinsic	3*	2	1	3*	5*	3*

Note. For confidentiality reasons, the participants were given random names in alphabetic order. Their health behaviours are described on the basis of their interview and survey answers to the questions about the frequency (and intensity) of four health behaviours.
┼The participant chose the option 'do not smoke' in the survey but then admitted smoking during the interview.
Survey scores on reported motivations for smoking, alcohol drinking, physical activity, and healthy eating are presented.
*scores above average in the sample (Table 3-3). Scale: 1=Not at all because of this reason, 2=A little because of this reason, 3=Somewhat because of this reason, 4=Mostly because of this reason, 5=Completely because of this reason.

Interview Questions

The first version of the interview protocol (Appendix F) was developed on the basis of 5 pilot interviews conducted in 2008. Then, the researcher's supervisor reviewed the interview protocol and it was refined in accordance with his feedback.

The interview questions were theory-driven, formulated on the basis of the previous research and were designed to match and expand on the participants' survey answers, so that integration of the findings would be possible (see Table 4-2). They covered six main constructs and consisted of the main questions and the probes, leaving a degree of flexibility for the interviewees to reflect and reason about relations and regularities in particular context. It was important, from a critical realism perspective, to make participants reflect during the interview on the possible causal mechanisms of their behaviours in particular contexts. To this end, if the participants had difficulties in explaining or articulating their reasons, they were asked to give an example, to describe the situation of their experience, or tell the story from their past.

The wording of the questions encouraged the participants to provide contextual detail (the questions that asked to describe), possible explanations (the questions that started with why) and to relate the constructs of interest to each other (the questions started with how). For example, the participants were asked to describe their health behaviours to get more detail about the context in which they were happening. Then, they were asked to explain the reasons for their behaviours to elicit possible explanations of the causes. Finally, they were asked to relate their reasons (or motivations) to, for example, their perceptions of self-control (cognitions), feeling positively or negatively about themselves (health outcomes) and significant others (social context). It was also an important part of the interview design that participants were asked to comment on their survey choices so that the data sets from Study 1 and Study 2 would have

potential to be compared and integrated at the final stage of analysis. In addition, it would allow comparing how the constructs were defined by the researcher (and the previous literature) in Study 1 and how the same constructs were understood by the participants in Study 2.

Table 4-2. Correspondences between survey measures and interview questions

Constructs	Study 1 Measures	Study 2 Tentative Questions
Health Behaviours	Single-item measures on frequency and intensity of smoking, alcohol drinking, physical activity, and healthy eating	Please describe your typical smoking/alcohol drinking/physical activity/healthy eating patterns of behaviour (in terms of monthly frequency and intensity).
Health Motivation	Self-Regulation Questionnaire	Could you please explain your choice of reasons (controlled/autonomous/intrinsic) for smoking/alcohol drinking/physical activity/healthy eating? Why is this reason relevant here? Of these reasons, which would you say is the leading one for you? Why?*
Health Cognitions	Health attitudes single-item measures	Is health important to you? Why?**
	Health Perceptions Questionnaire	Are you satisfied with your lifestyle and health routine? Would you like to change anything? Why?
	Psychological Health Empowerment Scale	How does it relate to your feeling of self-control/ sense of achievement? Do you experience any internal conflict?***
Health Outcomes	Self-reported health status single-item measure	How would you describe your health now?
	Emmons' somatic symptoms checklist	How does smoking/alcohol drinking/physical activity/health eating relate to your energy levels?
	Ryff's Scale of Psychological Well-being	Does it make you feel positive/negative about yourself? Do you experience any feeling of guilt/enjoyment? Why do you feel this particular feeling/emotion/mood?
Social Context	Support for Basic Psychological Needs Questionnaire (parents)	Does your behaviour/patterns of behaviour/reasons change depending on the people you're with? Are/were your parent an influential factor?
	Support for Basic Psychological Needs Questionnaire (friends)	Does your behaviour/patterns of behaviour/reasons change depending on the people you're with? Are/were your friends an influential factor?

Notes. * A question about the leading component of motivation was asked to find out if motivations had a hierarchical structure. ** It was also expected that the participants would be expressing their health attitudes while commenting on the reasons for their engagement in health behaviours. *** A question about an internal conflict was posed to find out more about the relations among the interviewees' health cognitions, motivations and patterns of behaviour.

Procedure

One-on-one semi-structured interviews were conducted in the spring-summer of 2009 at a time and place convenient to the interviewees (see interview protocol in Appendix F). The informed consent forms (Appendix G) were signed and returned at the beginning of each interview. All interviews were audio-recorded and their transcripts were later approved by the interviewees. The interviews averaged 60 minutes and the participants were not informed why they were selected to reduce social desirability and self-serving bias. After each interview, the participant was thanked and debriefed (Appendix H) and asked how comfortable he/she felt answering the interview questions. Right after the interviews, the researcher summarized her impressions and comments in the form of memos. Finally, all six audio-recorded interviews were transcribed verbatim, the typed text was reviewed against the recording for accuracy and minor edits were made to improve readability. The length of the interview transcripts ranged from 34 to 45 pages and large margins were left for the coding and the researcher's comments.

Interview Analysis

Despite the popularity of the critical realism perspective, there was little guidance on how to analyze interviews to describe and explain the elements of unobservable generative regulation mechanisms (Anderson, in press; Miles & Huberman, 1994). This study adapted the procedure of analysing interviews using within- and between-case qualitative data display models developed by Miles and Huberman (1994).

The logic of abstracting from the concrete and unifying after differentiating defined the structure and choice of analyses in Study 2. After preliminary analyses, which included engagement with the data and coding, within-case analysis focused on identifying unique features in interviewees' multiple health behaviour coexistence and regulation. Then, between-

case analysis used the retroduction approach (Reed, 2009) to unify findings and generalize about possible underlying regulation mechanisms.

Preliminary analyses. Reading the transcripts, coding manually, reading additional literature when new concepts were emerging from the text, developing new codes and reading and recoding again became an iterative process for the researcher. The initial coding was guided by pre-specified theory-based codes, developed on the basis of the theoretical and conceptual frameworks for the project, and their operational definitions were health definitions presented in Appendix A. The concepts within six main constructs and the relations among them were targeted. Then, in the process of transcript coding, other concepts were suggested by the data. For example, the concepts of social norms, social well-being, and incoming emotions (those that influenced motivations for health behaviours and related cognitions) emerged from the interview transcripts (see Appendix I with a final list of codes).

Three-level coding was applied. First, transcripts were read and coded for the presence or absence of the six main constructs. And although some questions specifically targeted those constructs, the information about the constructs could emerge throughout the whole text. Then, second-level inferential coding focused on the relations among the constructs. For the purpose of the research, two types of labels were used here: labels about the direction of the influence (unidirectional or reciprocal) and labels about the valence of the influence (positive, negative and ambivalent). Finally, third-level inferential coding was trying to elicit patterns of relations among the constructs that were suggestive of how multiple health behaviours could coexist and be self-regulated.

Within-case analysis. The goal of the within-case analysis was to identify unique features in interviewees' multiple health behaviour coexistence and regulation. Each transcript was

analysed individually in three steps. First, the codings were analysed and extracted from the text into within-case matrices (Appendix J). Second, the matrices were inspected and reduced. Finally, the written summary of the most important constructs and relations and the graphical representation of those constructs and relations were made (within-case display models).

The starting point of this analysis was filling in the descriptive matrices (multiple health behaviours co-occurrence, structure of motivations for health behaviours, health cognitions and incoming emotions, social context and health outcomes), and corresponding relational matrices (structure of motivations for health behaviours, health cognitions and incoming emotions, social context and health outcomes, other influences, and multiple health behaviour self-regulation) with the extracts from the text. Next, each extract in each cell of the descriptive matrices was analysed using content analysis and the elements of componential analysis. For each extract, it was determined if it referred to high, medium or low expression of the construct and what key words were used by the participant to describe it. Then, it was assessed how many aspects of the construct the extracts described. Finally, the aspects of the construct were labelled and the number of extracts in the cell was reduced to those best illustrating it. For example, in the cell describing controlled motivation for Eva two extracts, labeled 'friends' external pressure' and 'feeling of guilt' were kept because their key words could be clearly defined ('kind of pressured by my friends' and 'I feel guilty') and they referred to two different aspects of controlled motivation. In a similar procedure, but using mostly structural analysis (because the relations between variables were assessed), the relations were labelled as unidirectional or reciprocal, positive, negative or ambivalent. In case the same extracts from the transcript were illustrating corresponding descriptive and relational cells (e.g., descriptive and relational cells for control motivation), they were cited in the descriptive cells only.

It is important to mention that in the process of analysis, I took a critical stance and tried not to make sense of the answers at face-value. I was looking and choosing among the extracts from the transcript that were supporting each other. In case of contradictory evidence, I removed the extract if it referred to low expression of the construct and made inferences about it if it referred to high expression of the constructs and had some supporting (even indirect) evidence.

On the basis of the matrices, three to four causal networks, or within-case displays (one for each health behaviour), were developed for each participant (Appendix K). Those displays were graphs containing boxes with constructs. The boxes were connected by arrows representing the direction of influence (unidirectional or reciprocal). The arrows were marked by pluses and/or minuses indicating positive, negative, or ambivalent (both positive and negative) influence. The arrows reflected the researcher's inferences about participants' perceptions of causality. For example, if a participant asserted that family history of diabetes "influenced" his/her choices to eat healthier that would result in a positive unidirectional arrow from 'family' social context to the controlled motivation for healthy eating and then from the motivation to healthy eating. The leading position in the hierarchy of motivation was determined on the basis of the interviewees' answer to the question, "Of these 5 reasons, which would you say is the leading one for you?".

The main purpose of developing within-case displays was not in presenting all the possible concepts and relations but in singling out the most essential structural relations, the ones that were perceived as causal forces by the participants and could potentially reflect regularities at a higher level of abstraction. Those relations were graphically presenting regulation mechanisms within each health behaviour, but could not reflect the regulation mechanisms of multiple health behaviour coexistence. To this end, on the basis of causal maps and original matrices descriptive

within-case summaries were created to present individual differences of self-regulation mechanisms for each participant. Those summaries are available upon the request.

Between-case analysis. Between-case analysis focused on unifying findings and generalizing about possible underlying generative regulation mechanisms. To this end, it was not so much analysis as synthesis, based on retroduction. The concepts and relations across cases (presented in descriptive and conceptual matrices) were inspected carefully for essential elements and structures and then they were rebuilt into an ordered whole. Specifically, consistencies and differences between how participants perceived and tended to describe their multiple health behavior coexistence and regulation of smoking, alcohol drinking, physical activity, and healthy eating were studied thematically. It was a long iterative process of going between the data, conceptual abstraction, and back to the empirical data. At that point, causal language was permissible if multiple interviewees discussed a causal relation.

To support and illustrate those findings, between-case display models were developed for each behavior, based on the between-case analysis and individual within-case displays (Appendix K): four displays of smoking, alcohol drinking, physical activity, and healthy eating regulation (Appendix L).

Criteria used to ensure validity and reliability of Study 2. There are no well-established criteria applied to critical realism research. Usually, a mix of the criteria that have been developed for positivism and/or constructivism research is used (Healy & Perry, 2000; Shenton, 2004). This study was guided by several of them.

Validity criterion was understood as similar to the construct validity of positivism research in that it referred to how well information about the constructs in the theory being built were measured in the research. To meet this criterion, I used prior theory from health and motivation

literature to define the constructs. Then, I used well-established research methods (semi-structured interviews) to elicit the interviewees' perceptions and definitions of those constructs. I used iterative questioning (different aspects of the same constructs were targeted via main questions and probes throughout the interview) and then participants' check of the transcripts. Importantly, I didn't treat participants' perceptions as a reality. Rather, a participant's perception for realism is a window to reality through which a picture of reality can be triangulated with other perceptions. To this end, my reflective comments were also integrated into the analysis. However, inter-rater reliability was not applied in Study 2 for several reasons. First, because it has repeatedly been found as very low or problematic, or adding little rigor to qualitative exploratory studies (Armstrong, Gosling, Weinman, & Marteau, 1997; Barbour, 2001). Second, because at the later stage of analysis, convergent validity via triangulation of different methods and data sources was planned. In Study 2 my main focus was to ensure validity about generative regulation mechanisms of multiple health behaviours and their contingency in specific contexts. To meet this criterion, I concentrated on why things happened and not just description of them. To ensure that information was obtained from appropriate and information-rich sources, I described the context of the cases and provided information on sociodemographic characteristics of the interviews, and the context in which the interviews were conducted (e.g., length, place, that it was one-on-one interviews, the interview protocol, the letter of invitation, the use of consent and debriefing forms) and analysed (steps of within-case and between-case analyses).

Transferability was understood as a kind of analytic generalisation, or theory-building, in the context of the research. From a critical realism perspective, research must be primarily theory-building, rather than the testing of the applicability of a theory to a population. Critical realists do not say that theory-testing should not be done; they rather say that the theory has to be

built, and confirmed or disconfirmed, before its generalisability to a population is tested. Given the exploratory focus of the study, initial theoretical statements and assumptions about multiple health behaviour coexistence and regulation were tested to be confirmed, disconfirmed, or expanded by the interview data, so that at the later stage of analysis it would be possible to refine health motivation theory and present a model in a form suitable for future testing.

Finally, methodological trustworthiness was guiding the research to ensure that it can be audited. A database of descriptive and relational matrices and causal displays was developed, and relevant quotations were used in the written report. The database is provided in the appendices (Appendices K-M), and it is said that a reader could ask for written summaries of any of it. I also used quotations and tables that summarised the findings, and carefully described the key procedures I used such as case selection and data analysis. The steps taken in planning and conducting the interviews have also been described.

Results

The same research questions about multiple health behaviour coexistence and hypothetical mechanisms of regulation were addressed in Study 2 using within-case and between-case analysis. First, within-case analysis focused on identifying unique features in interviewees' multiple health behavior coexistence and regulation, in terms of motivational, cognitive, emotional and social contextual influences. Second, between-case analysis unified individual findings and suggested a possible 'family of answers' (Pawson & Tilley, 1997) on how behaviours ('alcohol drinking+physical activity+healthy eating' or 'smoking+alcohol drinking+physical activity+healthy eating') could coexist and be self-regulated in specific contingent contexts of university students.

Within-Case Analysis: Unique Features of Health Behaviour Regulation and Coexistence within Individuals

Individual descriptive and relational matrices were analysed and supporting causal maps, or within-case displays were created (Appendices K and L) and on the basis of them descriptive summaries were written. At that stage of analysis it was important to find as many individual peculiarities as possible and delineate the contexts and conditions of their functioning.

The case of Becky, a 26-year-old woman, was different in many ways from the rest of the cases. She was older, diabetic, had children (a daughter of 5), a history of quitting smoking and dealing with anger issues, and a family history of alcoholism, lung cancer, and obesity. Her descriptive summary is reported here in detail and accompanied by supporting causal maps (the descriptive summaries of other participants are available to the reader upon request).

Descriptive summary for Becky ('smoking+alcohol drinking+physical activity+healthy eating'). Although health is important to Becky (she is diabetic) and physical activity and healthy eating are important in her daily routine: "just staying active, watching what I eat", smoking and alcohol drinking are part of her lifestyle too: she smokes 4-9 days a month and drinks "once every two weeks".

Becky claims that her smoking is temporal (she has returned to it after two year break to help fight the stress of parting with her husband) and occasional (one cigarette per week). She emphasized repeatedly during the interview that she "...oh, I *barely* smoke..." even despite describing many instances and situations when she smokes (with friends and alone, when feels happy or stressed). It is important for her to differentiate between occasional smoking and chain smoking, temporal span of smoking and smoking as an addiction. Although she is fully aware of its negative outcomes, she feels that for the moment its positive outcomes outweigh the negative

ones with her. It is also noteworthy that smoking coexists well with her alcohol drinking, because they are part and parcel of the "socializing package" among her friends: "… whenever I go out with my friends … and have liquor I probably have like one cigarette a night and that's it." Importantly, her alcohol drinking came up in the course of the interview when she was speaking about her motivations for smoking and likewise happened with smoking merging in the context of her alcohol drinking.

Although Becky denies any external pressure, her controlled motivations have a lot to do with conformity and the mentioned above socializing norms among her group of friends: "…like they smoke heavily so… I go outside with them and have a puff with them. …if they will be smoking outside and I'll be standing out there … *watching* them?" Her motivation for smoking also has a very strong autonomous component to it: "It's just me, it's my choice so I sit down and just try to relax." It is closely linked with her intrinsic motivation which has to do with negative reinforcement, since she tries to ameliorate her stress and negative effect of breaking-up and parenting alone a small kid: "…so then sometimes I feel really frustrated so I just go and have a smoke and I have one to relax…even if it's just a puff …I do need it". Again, she is always speaking about one cigarette when describing her smoking (which might have an implication that she is either downplaying her smoking or indeed has a strong control over it).

The big part of her controlled motivation against smoking is her family history and her current physical state when she has to fight diabetes on a daily basis: "...well, my father had lung cancer and so he passed away from smoking, he smoked every day of his life… so I just have a pack of smokes on top of my fridge which I keep as a reminder for me all the time of my dad…" Still, her major influence here is her little daughter: "I don't want her to see me on alcohol or smoking. I want her to know that I live a healthy life and I'm trying really hard for her." The

controlled component of motivation is also supported by the feeling of guilt she experiences after smoking: "I do feel guilty after I smoke because… I don't know, I think it takes away some of my energy…… and that energy I could have been using with *her* … playing games…" The autonomous component has to do with her strong positive health attitudes and health empowerment: "I don't want to be an alcoholic … and I don't want to be a chain smoker … and I want to raise my daughter in a positive environment."

Like her motivations, Becky's cognitions and emotions are contradictory when it comes to smoking: good for dealing with stress but bad for health and energy levels, feeling relaxed, relieved, and guilty after smoking. To this end, she often experiences an internal conflict: "Like I don't want to be having trouble breathing… mainly because of that … and I don't want my daughter to see me smoke." The centre of her self-regulation mechanism is her health empowerment, namely belief in her self-control and competence, supported by her previous experience of abstaining from smoking for a long period of time: "…I could cut it out if I wanted to …. because I just started smoking in this year. I quit for two years." But strange enough, it also helps create a vicious circle for the participant because Becky often uses smoking for regaining her self-control: "Smoking and self-control? Yea, I would say that's a major part……of why I smoke sometimes…" My impression as a researcher was that her cognitions could be influenced and overwhelmed by her emotions in some situations (e.g., arguing with her ex-husband). Then, emotions became leading and "corrected" her attitudes regarding smoking to the effect that 'cognitive split' emerged (beneficial occasional versus harmful chain smoking).

The biggest influence of her family and friends is in that Becky tries to make her life and her daughter's life different from theirs (negative role model): "... I want to show her that I can live with it [diabetes]… and I don't have to … um falter or use alcohol or smoking… like

everyone does in my family. All of them do. Smoke and they drink..."

The outcomes of Becky's smoking are mixed in nature and pertain to her physical, psychological and social well-being. Still, at the moment what matters for her most are the positive outcomes of smoking related to her general psychological well-being and immediate effects on her feelings and cognitions: "It helps me like… it makes me relax and then I start thinking about the good stuff and the good things in my life so… by the time I'm done with my cigarette I'm fully relaxed and I can just think clearly. So it does make me feel positive after I'm done." As it was mentioned above, they outweigh the adverse outcomes she has now (low energy levels, feeling of guilt) or might develop in the future (health problems): "Positive side … if I didn't smoke that smoke then I would be really stressed out and I would be really upset… "

The structure of Becky's regulations of smoking is graphically represented in the causal map below (Figure 4-1).

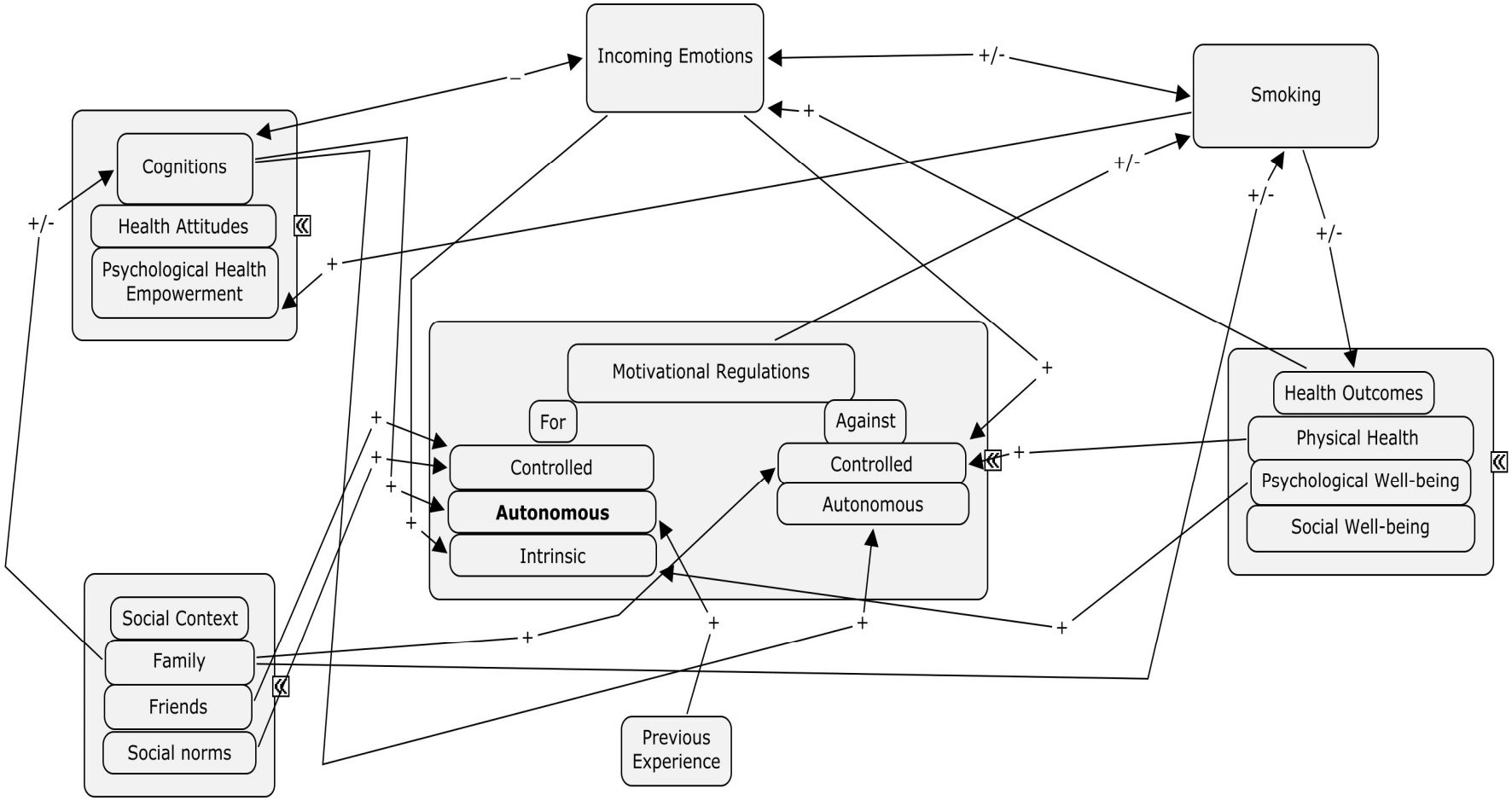


Figure 4-1. A display of perceived causal relations of smoking for Becky (female, 26-year-old, an occasional light smoker). Arrows indicate direction (unidirectional or reciprocal) and nature of influence (positive, negative or ambivalent) between the constructs. Motivation in bold indicates the leading motivation for the behaviours.

Similar to smoking, Becky views social drinking and alcoholism separately (and includes binge drinking into social drinking). Her controlled motivation for drinking has to do with both direct and indirect influences. On the one hand, she experiences external pressure from her siblings and parents: "Well, everybody in my family drinks. They are alcoholics, most of them can't go without it a day…I didn't want my daughter to go though that so … I moved away." On the other hand, it has to do with conformity and socializing patterns among her group of friends: "…when we meet up again we always find our way to a bar or a pub or something…"; and mainstream Canadian culture: "…because alcohol is such an important subject in most people's social lives …" Her autonomous component has to do with thoughtful choices she makes whether to drink or not, usually in the context of having "a celebration with my friends and my family". Finally, her intrinsic component also has a social side to it, since it often has to do with the enhancement of her social well-being: "...sometimes I just need to go and have fun with my friends…" Regarding the hierarchy of components, although Becky claims that it is autonomous motivation ("I always think everybody has a choice to do whatever they wanna do..."), the analysis of her interview data suggests that the controlled component is no less important in the structure of her motivational regulations. The dynamics of her motivations for drinking started from controlled and intrinsic, and then gradually the autonomous component came into play.

Her controlled motivation against alcohol drinking has to do with her daughter, the participant's physical state (being diabetic), and family history and is strongly supported by a range of negative feelings (fear, anxiety, guilt, embarrassment, internal conflict) she experiences before, during and after drinking: "Before I go out I'm kind of scared, I feel scared. Like it could start off good but then … everything could just … crumble. Like you never know what happens when you go out… and during it, I feel … I don't know… anxious. Because the people that I'm

with … umm… knowing how crazy they are I feel guilt afterwards that's why I don't drink." Her autonomous motivation is defined by her strong attitudes against alcoholism: "I know what alcohol can do to a family... the alcohol rules their lives [parents]…they plan stuff around their alcohol. I want to be in control of my life… and not the bottle in control of me".

Alongside motivations, emotions and cognitions are influential in the participant's self-regulation mechanism of alcohol drinking: "…when I'm happy and around certain family members I haven't seen in a long time… then I will go and have like a couple of drinks… when I'm depressed I don't wanna go drink." Still, self-control has always been of prime importance for Becky because that was exactly the thing that her alcoholic parents have always been lacking: "…so it was like a control issue with them…". Since alcohol drinking has an adverse effect on her feeling of self-control: "umm … some of the choices you make when you are drinking ...I don't like alcohol because … I don't have control … over myself...", Becky often opts out for being a driver or not going at all: "I try to avoid alcohol all together… ever since I had my daughter I *barely barely barely* ever went out."

Her daughter is the biggest influence on her when it comes to health and lifestyle choices: "I wanna be someone…my daughter can look up to, she doesn't have to feel embarrassed...when half of me wants to go out … and get drunk whatever … the other half tells me, 'You have to be responsible' because I have these little eyes looking at me." Then comes her mother: "...she gives me good advice, she tells me that I don't have to do this because of my friends..." The influence of friends and siblings is minor.

Alcohol drinking brings about mixed outcomes for Becky. Regarding her physical health, it is always negative because "when I drink alcohol my sugar skyrockets…" With psychological well-being, the outcomes are diverse; while drinking helps her relax, unwind, and feel positive

about herself, it also drains her energy a lot: "… I feel like it slows me down, takes up my energy..." It seems that only her social well-being is not negatively affected by her drinking.

The structure of Becky's regulations of alcohol drinking is graphically represented in the causal map below (Figure 4-2).

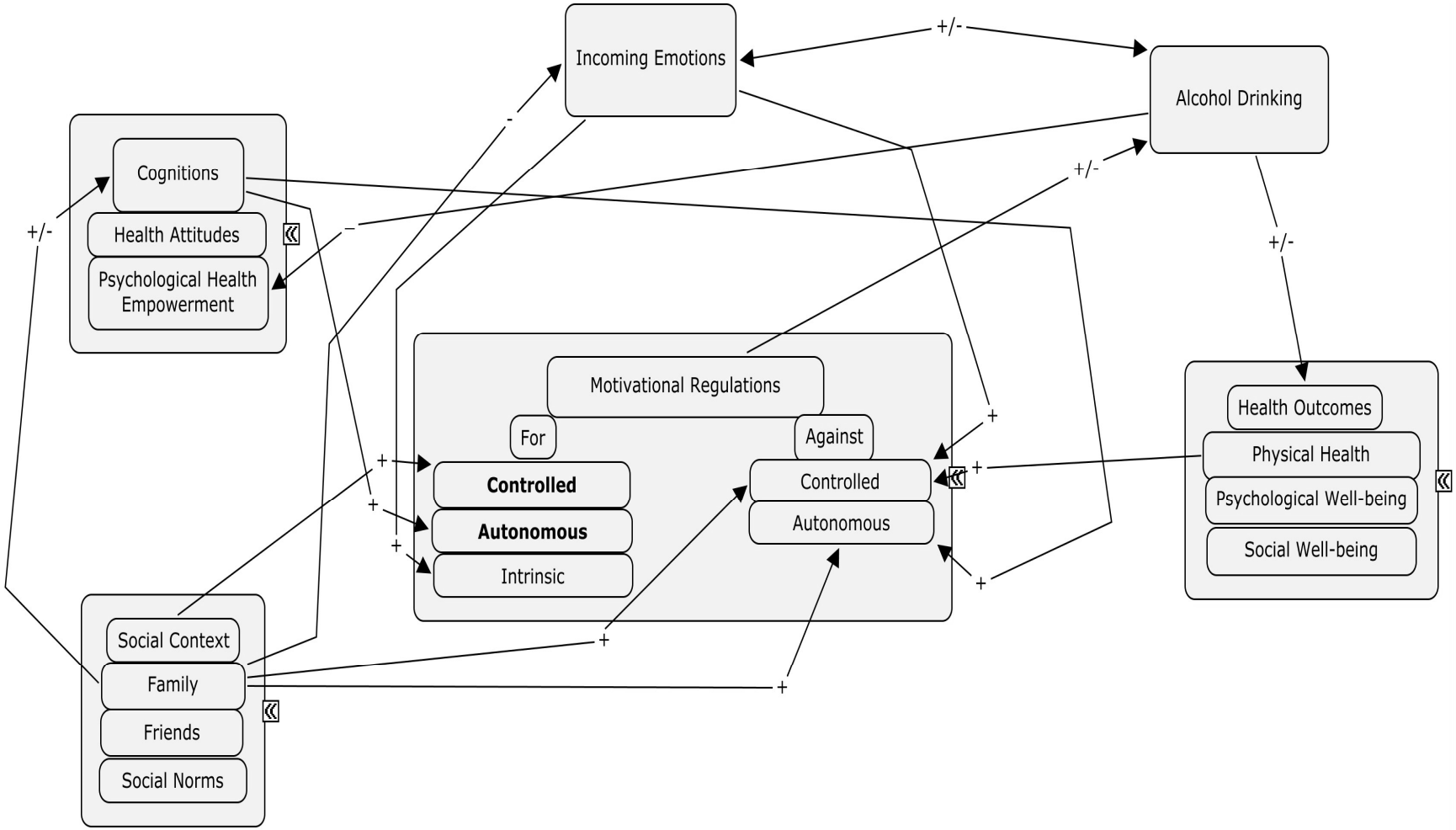


Figure 4-2. A display of perceived causal relations of alcohol drinking for Becky (female, 26-year-old, a low-risk drinker with 1-2 days of binge drinking). Arrows indicate direction (unidirectional or reciprocal) and nature of influence (positive, negative or ambivalent) between the constructs. Motivation in bold indicates the leading motivation for the behaviours.

Physical activity and healthy eating coexist as two essentials of Becky's lifestyle because of her illness: "It's important to me because when I take insulin I have to eat and then right after I eat I have to work the insulin throughout my body so I have to keep on constantly moving… I have to do some kind of exercise *every* day otherwise if I don't do that my sugar will get up there, I will get sick…" To this end, self-control becomes a very important factor in her life which she has to exercise daily to balance out both physical activity and healthy eating at the same time.

The distinctive feature of Becky's motivational structure for physical activity is that her controlled and autonomous motivations, such as self-image and importance of health, almost merge to the effect that the participant does not perceive to be extrinsically motivated at all: "…mostly I exercise because of my sickness and … because I don't wanna be overweight like my sisters…" Her intrinsic motivation is, and has always been, strong and the leading one: "I was *always* in sports, always. I used to go to a sports school... I was *always* running. If not that I was biking, walking… I like volleyball… soccer…I like all these kinds of games, running games mostly. It makes me feel good about myself. I feel happy…" Her controlled motivation against physical activity is not strong and is related to the time constrains going to school places on her: "Sometimes I can't find the time for it……because on my busy days I'm always here at the university sitting down at a computer…a lot of cram time for books…" Regarding the dynamics of how her motivational regulations developed in time, first it was sheer fun, and then the autonomous and controlled components developed when she learned about her illness and the issues of weight management came up, and, currently, it is a mixture of importance and fun for her.

Becky's cognitions and emotions work in balance with her motivations for physical

activity. Interestingly, no matter what kind of emotions she starts with, physical activity always turns them into positive ones. This particular feature of physical activity once triggered her running regularly: "like before in high school I used to jog about a mile every morning before school … and after school … it would just help me release my anger, thoughts or whatever. Whatever conflicts that came to me I'd be able to run and think. I'd be feeling a lot better and became one with nature and…this way my negativity would be altered..." I is also noteworthy that the regularity of practice makes this positive influence go both way to the effect that skipping physical activity results in negative emotions that the participants cannot explain: "Probably because I have it so much in my life like… physical activity… I feel bad when I don't do it…". Likewise with self-control which is central to the participant's mechanism of self-regulation, the positive influence goes both ways: "It …umm…makes you be in self-control".

Regarding family and friends, only her daughter is an influential factor when it comes to physical activity (and healthy eating too): "…me and my daughter we love water so we are always like running and playing and drinking water and having vegetables and stuff like that… I'm just basically health wise cuz I don't want my daughter to be a diabetic."

The outcomes of Becky's physical activity are better physical health and psychological well-being: "I have to say I'm in the best shape of my life right now." They are related to her feeling a sense of achievement and becoming more energetic: "I feel a sense of achievement... because then I realize, 'Hey I did it another day, I got more energy...I got my exercise for today'."

The structure of Becky's regulations of physical activity is graphically represented in the causal map below (Figure 4-3).

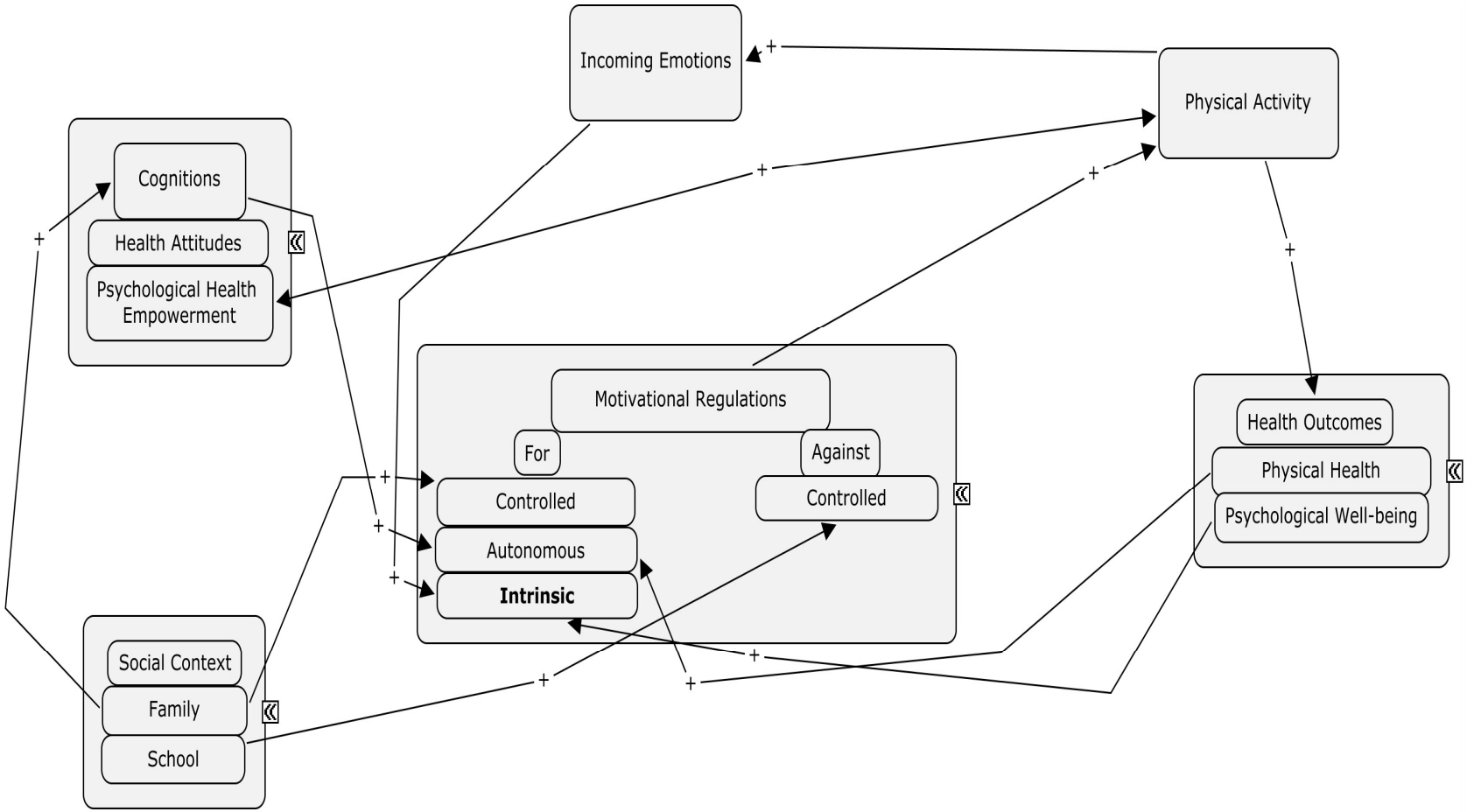


Figure 4-3. A display of perceived causal relations of physical activity for Becky (female, 26-year-old, moderately physically active). Arrows indicate direction (unidirectional or reciprocal) and nature of influence (positive, negative or ambivalent) between the constructs. Motivation in bold indicates the leading motivation for the behaviours.

Healthy eating is a long established practice for Becky:"… I was the healthiest one [in the family]… all the way…. I never drank pop. And then when I hit 17 I found out I was a diabetic…" Junk food is hardly there for Becky because of her strict diet, the concept of 'treat' is also different and goes only as far as a juice box: "[when] I know that it [sugar]'s down … I could treat myself to a juice or something. I always look forward to juice."

Her controlled motivation is strongly supported by the feeling of guilt that she experiences whenever she eats something off her diet and it shows on her sugar monitor: "Because I don't want to look on my sugar monitor and see that it's high, I want to keep it as good controlled." It also has to do with weight control motives: "...it keeps my weight off..." and the fact that her daughter would have the same meal. The latter motive is closely related to Becky's autonomous motivational regulation too: "I was always trying my best to stay healthy ... because I always gotta watch what I eat. And because whenever I make supper my daughter is gonna eat it too." The intrinsic component reveals itself in that the participant enjoys her food: "I like my snacks… the vegetables I get to eat. And… these diabetic meals that I make, no sugar… they taste pretty good"; and her love for cooking, her ability to cook well and "make it fun but healthy" seems to add to the intrinsic component of motivation substantially. Regarding hierarchy, the autonomous motivation has always been the leading one for Becky ever since "I've seen him [father] suffer with his diabetes... like him keeping it low and seeing what he had to do …… it just seemed like a tiring life for him and I didn't want that for me. "

The participant's controlled motivation against eating healthy has to do with the fact that healthy food is not easily available to her: "Well, it's hard to find healthy foods with low sugars in. It's a major struggle because I'm always having to look for sugar twin for my coffee and I need to look for the non-fat stuff and zero-sugar, zero-glucose all that, even when my daughter

buys chips I make sure she gets like the … like hardly any sugar in it." On the related note, her intrinsic motivation working against healthy eating has to do with her natural urge to try new foods: "…sometimes I just wanna flop off my diet… I want to try some foods um… I want to try different foods but I can't because they are bad …too much sugar in it…"

To this end, she often has to deal with internal conflicts when her motivations, emotions, and cognitions fall out of balance (e.g., when she is tempted to try something new and unhealthy). This requires exercising lots of self-control on her behalf: "*All* the time….I have to keep saying to myself, 'You're watching your sugar… You're doing this for your daughter … You have to remember to keep your … to keep calming your um… sugar intake … and remember your insulin."

Similar to the motivational pattern for physical activity, her daughter is the only significant other who is influential with Becky: "I have to make it [healthy food] look attractive for her to eat so she'll keep eating it…" and supports her basic psychological needs: "Just knowing that I have my little girl there with me, she's always telling me, 'Right on, mommy!' She is always encouraging me."

Regarding outcomes of healthy eating, they are always positive when it comes to physical health but can be controversial for psychological well-being: "…a little bit of both." On the one hand, Becky does feel more energetic if her sugar is controlled and has a sense of achievement: "I get to check my sugar later and I know it's low and I know I'm doing something good"; but on the other hand, she feels unhappy that she has to constantly control her cravings and that the foods, that are cheap and easily available, are not good for her.

The structure of Becky's regulations of healthy eating is graphically represented in the last causal map below (Figure 4-4).

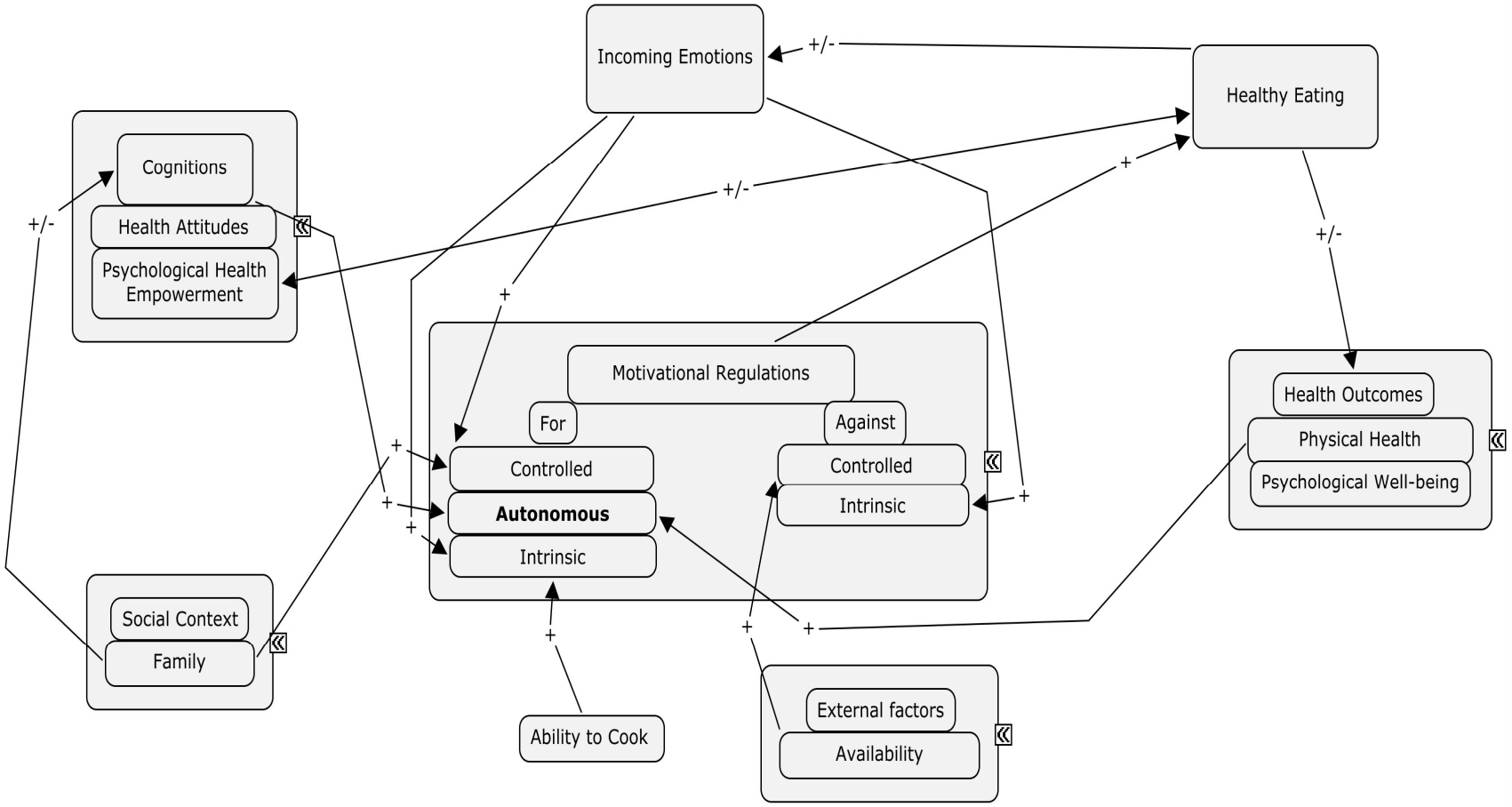


Figure 4-4. A display of perceived causal relations of healthy eating for Becky (female, 26-year-old, moderate on healthy eating). Arrows indicate direction (unidirectional or reciprocal) and nature of influence (positive, negative or ambivalent) between the constructs. Motivation in bold indicates the leading motivation for the behaviours.

Between-Case Analysis: Generative Mechanisms of Health Behaviour Coexistence and Regulation in Specific Contexts

Within-case analysis of the participants' reasoning behind their health behaviours coexistence demonstrated both unique and common features. For example, all interviewees talked about their motivations for and against each behaviour, and emotions were described to be as important as cognitions and motivations in the regulation of health behaviours. To explore that, between-case analysis focused on unifying individual findings using a retroduction approach (a complex iterative process of moving between conceptual abstraction, theory-building, and empirical evidence). Individual descriptive and relational matrices were collapsed across the participants and analyzed to answer the research questions about coexistence and hypothetical mechanisms of regulation. And between-case displays were developed to graphically represent and support the findings (they are attached in Appendix L).

At the first stage of analysis, common or related regularities, suggestive of underlying generative causal mechanisms were studied. For example, motivations and their influencing factors were collapsed into the following table (Table 4-3).

Table.4-3. Comparative matrix of motivations for six interviewees

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Alice: Alc_Intr PA_Intr HE_Aut	Ctrl_for		*'A little bit', for social drinking*: has to do with conformity and social engagement: just because your friends are always drinking and they're like, "O, come out, you never come out with us" and you kind of feel like you're going to be left out of something if you're not out there.	*'A little' to external pressure of coach*: …like my coach is a *big* external pressure… *Self-image motives*: I like the size and shape and everything that I am and I want to keep it that way	*'A little bit' to media and social norms*: like everybody is always talking about … like even in the media and everything about eating well and all that … just like how thin everyone is in Hollywood and stuff like that… *Self-image motives*: I think it does affect people because everyone is trying to be the standard size… *Yes, 'somewhat' because of avoiding guilt:* just because I know it's not good for your body … avoiding foods that you know you shouldn't eat, like greasy foods and chips and stuff like that.
	Ctrl_against		*'Yes' for binge drinking*: It's just guilt, you know you shouldn't have done it…		*'Yes' has to do with the cost and availability of healthy vs junk food:* 'not good for you' foods seem to be a lot cheaper than 'good for you foods' so…
	Aut_for		*'Yes' for social drinking:* I am confident when I'm going out that I'm not going to get out of control	*'Really important'*: It's just important to have a healthy lifestyle; that's something that's really important to me…	*'Very important'*: It's important to … again just to live a healthy lifestyle so that you're ready to do whatever you need to do.
	Aut_against		*'Yes' for binge drinking*: When you respect yourself and your body … you don't overdo it…	*'Somewhat'*: Somewhat [school interferes]…I don't know, again it's about finding a balance	
	Intr_for		*'Yes' for social drinking*: it's just *fun* kind of sometimes…. I enjoy the social part of it… how you can once you have a drink or something you're more likely to be open and having more fun	*'Yes'*: I really like being physically active …I just know that it's something that I enjoy doing and like to do and I like the results that it gives me so I do it…	*'Yes' not strong*: Well, not so much the fun but like …a pleasure. I like knowing that … I'm being healthy… I like how it tastes too. It's good.

	Intr_against				*'Yes'*: …if I really want something I'll have it whether it's good for me or not.
Becky: Smk_aut Alc_ctrl Alc_aut PA_intr HE_aut	Ctrl_for	*'No", but external influence of friends and situation:* I would say it's influential. Like from my friends… if they will be smoking outside and I'll be standing out there … *watching* them?	*'Somewhat' to external pressure of family*: everybody in my family drinks *Friends:* when we meet up again we always find our way to a bar or a pub or something *Mainstream culture:* "…because alcohol is such an important subject in most people's social lives …	*'No' but admits external influence of negative example (sisters):*...because I don't wanna be overweight like my sisters	*'Somewhat' to avoiding guilt*: Because I don't want to look on my sugar monitor and see that it's high, I want to keep it as good controlled.
	Ctrl_against	*Against chain smoking because of family history of lung cancer:* ...my father had lung cancer and so he passed away from smoking, he smoked every day of his life… I just have a pack of smokes on top of my fridge which I keep as a reminder for me all the time of my dad… *External influence of her daughter:* don't want her to see me on alcohol or smoking, I want her to know that I live a healthy life and I'm trying really hard for her *Feeling of guilt:* I do feel guilty after I smoke	*Against alcoholism because of family history, diabetes:* I know what alcohol can do to a family...	*Minor, relates to school load*: Sometimes I can't find the time for it……because on my busy days I'm always here at the university sitting down at a computer…a lot of cram time for books…	*Not easy available*: it's hard to find healthy foods with low sugars in. It's a major struggle because I'm always having to look for sugar twin for my coffee and I need to look for the non-fat stuff and zero-sugar, zero-glucose all that
	Aut_for	*'Chosen and considered'* (words it as 'my choice', especially strong for smoking alone): I don't have to prove anything to anybody. It's just me it's my choice so I sit down and just try to relax	*' Chosen and considered*' (words as 'a choice' to go out or not, how often, be a driver): I always think everybody has a choice to do whatever they wanna do …… and they don't have to choose going out to get hammered everyday or every week or something like that.	*'Important' (to stay healthy with diabetes), yes to chosen and considered (not to be overweight)*: It's important to me ... I have to keep on constantly moving… ... I don't wanna be overweight	*'Important' (to stay healthy with diabetes), yes to chosen and considered (diet plan):* it's fully chosen because I always gotta watch what I eat. And because whenever I make supper my daughter is gonna eat it too
	Aut_against	*Against chain smoking*: I don't want to be a chain	*Against alcoholism:* I want to be in control of my life… and not the		

		smoker …	bottle in control of me		
	Intr_for	*'No' but experiences positive feelings*: happy, relaxed, in tune with myself	*'A little bit' because means socialising and 'having fun'* (part of which is acting 'irresponsible') "...sometimes I just need to go and have fun with my friends…	*'Yes' because experience positive feelings from sports* : For fun, I'm a very competitive person.. I like volleyball… soccer… I like all these kinds of games, running games mostly	*'Yes' because loves cooking and healthy snacks:* I like my snacks… the vegetables I get to eat. And… these diabetic meals that I make, no sugar… they taste pretty good
	Intr_against				*'Yes' loves to try new foods*: sometimes I just wanna flop off my diet… I want to try some foods um… I want to try different foods
Colton: Alc_aut Alc_intr PA_intr HE_aut	Ctrl_for		*'No', then 'minor pressure' of family drinking culture and social norms*: with external pressure, it's pretty.. minor pressure I guess – like everybody in my family drinks and my parents are wine drinkers at dinner, and all the time they'll say, "Colton, would you like a glass of wine?" and I'm pretty good for saying no, but sometimes I'll just say whatever, sure, I'll have some.	*Self-image motive:* ...to be honest, I don't want to be fat… that really got me scared and started... *Social norms of body shape to be sign of health*: …you can always tell just by looking at a person, like you know they take care of themselves, they respect themselves... because they keep themselves in shape, they look after themselves...	'*No', then 'natural 'external pressure from living with parents:* I have a pretty good diet right now, and ... mostly that's responsible for my mom because she does all the grocery shopping. And she makes really smart choices *Self-image motives:* like people who I guess you could say, eat like crap look like crap ... if I was obese it would be a self-esteem issue for me, um because ... people would be saying that about me and looking at me in that sort of way
	Ctrl_against		*'Yes' against addiction:* I have parents that drink and stuff, so I kind of saw it all around me all the time... but nothing in extreme		*Minor external pressure from friends* who are Mac Donald's eaters
	Aut_for		*'Thoughtfully considered or fully planned', for social drinking*: I do plan on going out and drinking a little bit... if I'm going to be getting drunk or something, before I get too far I make sure I can get home *'Fully planned', for binge*	*'Important':* it's a good thing and it is important to me	*'Important':* …I think diet should be important for everyone ... there is nothing bad that comes from being healthy

			drinking: as far as binge drinking goes, usually that happens when it's kind of like a planned event ... like when I go out to like the lake or something with friends		
	Aut_against		*'Yes' against addiction:* [against] become like, addicted or an alcoholic sort of thing. That's a little extreme		
	Intr_for		*'Fun':* Like it is fun, I'm not going to say it's not. When I go out with my friends, I have a good time. Let's you unwind, loosen up	*'Fun' and pleasure:* I enjoy going to the gym ... I actually love going ... you know, just running on the treadmill, listen to some music, ...or just lift some weights	*'Not fun' but 'normal':* It's not fun at all...I feel normal I guess. Like I don't feel good about myself that I ate a good meal, but I don't feel bad about myself for eating a good meal, it's just – I just feel normal, fine, it's what I'm accustomed to. It's what it's always been like.
	Intr_against				*'Yes' for fast food:* I give myself a treat here and there... I enjoy a pizza from Pizza Hut and I don't feel bad about eating it ... never
Danny: Alc_ctrl Alc_intr PA_aut HE_aut	Ctrl_for		*'Yes' for social drinking*: You go if all the guys, like the everybody in the team and everything, you have free alcohol provided by somebody whatever, just the social thing to do… And I think when you get that level, like you get to engage, when you get to those functions, it just seems to be the norm *'Yes' for excessive drinking*: "… that's the only way that I could think about … because I won't do drugs. I did not want to do the whole counseling thing about time, and alcohol is the only thing that I have known to be there …	'*Little': external pressure:* little because … football which is an external pressure… it's my sport and I chase this for my coach. They set goals for me, as they want me to achieve … in certain metabolism in my physical fitness.	*'A little bit': external pressure*: ...we do have… a nutritionist and… everybody kind of keeps an eye on you… on the football team.
	Ctrl_against		*'Yes' for excessive drinking:* May be that what seats my most standing on it now, the fact that I had bad experiences about it		

	Aut_for		*'Important' for social drinking:* …it's important for me like I said to be social, and if that's the only option available, then, yeah, that's important.	*'Important'*: I have that like entirely because of this reason… because it is important for my sports… like my football and uh… my well being *'Chosen and considered'*: yeah it's thoughtfully considered as a fully chosen I spent time planning what I'm going to do at the gym. And, everything.	*'Important'*: … you do have like a standard, what you should eat, and such, I do believe that it's important especially for your workouts, for your sports, for your energy levels throughout the day, everything…
	Aut_against		*Against excessive drinking:* It's not healthy for you, like to excessively drink.		
	Intr_for		*'Yes' for social drinking, has to do with fun and self-enhancement*: Well, I enjoy what it is, I enjoy its taste. I think it's refreshing ...and it's fun to go and hang out with friends… *'Yes' for excessive drinking*, has to do with coping with the negative affect: …like avoid guilt that I placed on myself [after the break up with his girlfriend]… for that moment, it was to escape, like I could just put it off for a while ... I could just off the guilt, put off the pressure, and just avoid all the fingers pointing at me.	*'Yes'*: I love football. I can't say anything beside… I love football.	*'Yes'*: I do feel good about eating healthy.
	Intr_against				*'Yes'*: Well, at the same time, I will… snack on bad stuff coz it tastes so good. …
Eva: Smk_intr Alc_intr PA_aut HE_aut	Ctrl_for	*'No', then 'a little', indirect:* my friends would never make me to feel pressure to have one, never… They would like me [to smoke], like once in a while, in a month.	*'A little' to indirect external pressure:* …if I am at the bar, let's say one of my friends buys me a shoot, then, I always have that, that's why I guess I put a little because of this reason … if someone knows that I am not drinking … and they buy me a drink, that is a way of pressuring someone to drink. *'Yes' to get approval:* everybody	*'A little' to friends' external pressure*: I am kind of pressured by my friends, and I pressure my friends to go to the gym to just have somebody to go with…not a bad pressure, it's a good pressure. *'Yes' to feel guilty:* And if I don't go, I feel guilty. Because I know, that is good for me, I feel better after, so if I don't go I know I will	*'Yes' to indirect external pressure*: when I talk to my friends about, or my sister about something like somebody else cooked, you know, then I am always like… uh… that's sounds healthy maybe, maybe I will try it too, you know, so, it's just sharing a recipe between people something like that feel pressure

			is like that there is a reason that you need to fit in, I think so.	feel guilty that I didn't go.	to eat healthy or to cook healthier. *'Yes' to feel guilty:* I just feel guilty if I eat unhealthy, if I eat really fatty food or anything like that… Cooking something that s unhealthy when I know there is healthier ways to make it.
	Ctrl_against	*'Yes' against smoking:* just the idea of cancer can be linked to it. And that's just kind of scares me. *'Yes' against smoking as an addiction:* my parents used to smoke a lot, and then they quit, but after once a while they will have smoke or like a little cigar or something like that. And they can have a smoke once a while but never get addicted to it again, I guess …I am kind of learned it from my parents, I don't know.	*'Yes' against heavy, addictive drinking:* two of my uncles are alcoholics		*'Yes' because of some friends' indirect influence*: some people, you know they just make hamburger helper or something like that, because they are fast,
	Aut_for			*'Important'*: it is really important, for physical activity…I know that is really good for you … know these health benefits	*'Important'*: because it is important, I answered for completely, because of this reason.
	Aut_against	*'Yes':* smoking is not good for you ever … the idea that being [smell] like a smoker just it's kind of, I don't know, it's just not for me.	*'Yes' against heavy, addictive drinking:* I just don't think I can be addicted to something, because I just feel I do have control of myself		
	Intr_for	*'Fun'*: I enjoy it, like I enjoy it once in a while.	*'Fun' and tastes good:* it's just something that I enjoy…I enjoy the taste or stuff like that, like I never order drinks that taste gross…	*'Fun'*: I understand it's fun	*'Fun' to cook*: because I love cooking, so, to find ways to make stuff more healthy is always fun to do.
	Intr_against		*'Yes' against heavy, addictive drinking*	*'Yes' because of negative incoming emotions*: I guess I feel that reluctant to go	*'Yes'*: unhealthy foods can taste better: ..whole-wheat flour, does not taste as good as the white flour…
Faith:	Ctrl_for		*'Little' for indirect peer pressure:* ...external factors aren't	*'Yes' to external pressure of social norms*: external pressures,	'*Yes' to external pressure and guilt feeling*: Because of

Alc_intr PA_intr HE_aut			really big part... like I don't get persuaded to drink more than I want to... knowing your friends and they want drink, and you just casually drink with them… *Influence of social norms:* I guess I can have just as much fun if I am not drinking, so really, it's not a necessity, it's just what everyone else is doing	yeah, I definitely feel the media today is definitely pushing people to be skinny, and I find difficult sometimes. *'Yes', seeking approval:* I would say family members or the opposite sex, more, you know, if you were looking for someone like a boy friend or something, you want to look good	external pressures, un…I was always taught by my parents to eat well, and, en…yeah, I mean external pressures ties with getting guilt, I mean I don't want to feel guilty because I am eating stuff that my parents wouldn't approve of it.
	Ctrl_against		*'Yes' to external factors:* if I have the money to drink ... depending on school, or getting exams, if I have exams, I won't drink alcohol. I will go social, but I don't drink		*Admits external factors:* sometimes it's difficult to be healthy, sometimes it's really convenient to eat not healthy food.
	Aut_for			*'Important'*: I just think…a healthy lifestyle is important, being physically active… is part of the healthy lifestyle. *'Yes' to 'thoughtfully considered'*: I mean I do consider the factors of being physically active and not being physically active.	*'Yes' to 'important' and 'thoughtfully considered'*: I would put combined, just like I said from past year learning about nutrition and how important it is to have healthy diet, so, yeah, those two I would say would be more recently the past year for being important.
	Intr_for		*'Fun' for social drinking*: it's just for fun, yeah...the taste of it too	*'Fun'*: I feel that I am having fun when I am being physically active, and play sports...I found sports is absolutely fun…un… I love it competitiveness,	*'Fun':* because it's fun. I like to cook...I found cooking is really fun… so…um… yeah, I mean I think it's fun to be able to cook healthy meals instead of getting fast food. *'Pleasure'*: I enjoy the fact that you can eat healthy food and you can still have the food taste good and healthy.

Note. Ctrl_for=Controlled motivation for the behaviour; Ctrl_against=Controlled motivation against the behaviour; Aut_for=Autonomous motivation for the behaviour; Aut_against=Autonomous motivation against the behaviour; Intr_for= Intrinsic motivation for the behaviour; Intr_against=Intrinsic motivation against the behaviour.

The leading motivations for each health behaviour are reported, based on their answers to the question: Which of them [motivations] is the leading one for you? They are presented the first column under the interviewee's name, using the following codes:

Smk_ctrl=Controlled motivation for smoking, Alc_ctrl = Controlled motivation for alcohol drinking, PA_ctrl= Controlled motivation for physical activity, HE_ctrl= Controlled motivation for healthy eating, Smk_aut=Autonomous motivation for smoking, Alc_aut= Autonomous motivation for alcohol drinking, PA_aut= Autonomous motivation for physical activity, HE_aut=Autonomous motivation for healthy eating, Smk_intr=Intrinsic motivation for smoking, Alc_intr= Intrinsic motivation for alcohol drinking, PA_intr= Intrinsic motivation for physical activity, HE_intr=Intrinsic motivation for healthy eating.
The leading motivations against health behaviours are not reported because no special question was asked and the data is missing for the interviewees. ‘Yes’, ‘No’, ‘A little’ – are answers to the direct question if this motivation (‘reason’) is relevant.

Then, the regularities were thematically analyzed and unified into an ordered whole. Within it, integrated individual findings were grouped into 'families of answers' (Pawson & Tilley, 1997). They described main characteristics of multiple health behaviour co-occurrence (Research Question 1) and explained in causal terms how generative mechanisms of multiple behaviours ('alcohol drinking+physical activity+healthy eating' or 'smoking+alcohol drinking+physical activity+healthy eating') could function in specific contingent contexts that were studied (Research Question 2).

When multiple health behaviours co-occur, *motivations feel related*. Most of the participants (five) at some point during their interview spoke about motivations as related or that they 'tie in together' (Colton). Usually, it's motivations within behaviour, and it's controlled with autonomous or autonomous with intrinsic motivations that tended to cluster together. Controlled and autonomous motivations for physical activity, such as self-image and importance for health, were closely linked for Alice, Becky, Colton and Faith. For Alice, it was hard to differentiate between them: "I don't know, you're pushed [the coach and friends] but it's more of an internal thing too because you *want* to be better… and it's just important to have a healthy lifestyle". With Becky, they almost merged to the effect that she did not feel to be extrinsically motivated at all: "…mostly I exercise because of my sickness and … because I don't wanna be overweight like my sisters…" Autonomous and intrinsic components for healthy eating were reported to be closely related by Alice: "… not so much the fun but …a pleasure. I like knowing that … I'm being healthy… like satisfaction that you're doing something that's good for you" Also, Colton tried to explain that his autonomous and intrinsic motivations should work together for him to experience positive outcomes of binge drinking: "... if I haven't considered it and thought ahead about the times or what I'm going to be doing for the night, well, then I'm not

going to drink, but if I do think about it, then sometimes I do drink ... and enjoy it".

None of the participant provided comprehensive evidence on how their motivations across behaviours were related. They could simply answer 'yes' to a direct question, as was the case with Becky when she was asked about her autonomous motivations for both smoking and alcohol drinking. But none of them chose to speak about it on their own will.

There was evidence from more than one interview that motivation, or 'reasons', were the topic that the participants found difficult to reflect on: "I never thought it would be difficult, but it is.."(Faith). Alternatively, it could be something that they were not used to, or did want to reflect about. For example, Eva tried to reason about her intrinsic motivation for smoking in the following way: "…I don't really know why I enjoy it, because this is kind of hard to explain, because I feel the exact same before I feel the exact same after I have cigarette, so I don't really know why I enjoy it."

When multiple health behaviours co-occur, *motivations have a hierarchical structure*. All the participants reported hierarchical structure of their health behaviour motivations. They provided reasons for and against their engagement in a particular behaviour, they could describe the dynamics of how their motivations developed and they could single out the most important (the 'leading') motivation for their current behaviour. In most cases, the leading component for alcohol drinking and physical activity was intrinsic motivation, and autonomous motivation was the leading component for healthy eating. For example, Colton, looking back to the years of his high school, reflected that his motivations for alcohol drinking gradually developed from controlled and intrinsic to mostly autonomous and intrinsic: "...earlier in high school, it would probably be external pressure, like friends have a big influence on you... [but now] ...I do plan on going out and drinking...and enjoy it". Interestingly, three participants (Alice, Colton and Faith)

mentioned that the nutrition course they took at the university added to their automous motivation for eating healthy: "... and just like I said from past year learning about nutrition and how important it is to have healthy diet, so... I would say would be more recently the past year for being important [to be the main reason]".

When multiple health behaviours co-occur, *social context is more influential than individuals perceive it to be.* 'No' or 'a little bit' (see Table 4-2) was a frequent first answer of the participants to the question about the role of controlled motivation. Then, gradually, numerous influences emerged, and the interviewees were speaking about them as influential factors: family history, social norms, negative or positive example of siblings, pressure from friends, family upbringing and media. Between-case analysis found that, for example, the family supported controlled motivation against smoking and binge drinking (Danny, Eva), contained smoking frequency (Becky, Eva) and boosted the participants' health empowerment (Alice, Colton, Danny, Eva, Faith). Established family practices defined eating habits of five interviewees. For example, Eva explained that: "…when I was younger, it's just the way I grow up ... now I understand why stuff is healthier, now it's important… when I was younger it's just the way that my mom cooked."

Multiple health behaviours are best self-regulated when *motivations are harmonized with individuals' cognitions and emotions ('in balance')*. The importance of emotions in the self-regulation of multiple health behaviours became a recurrent theme in all the interviews. To be more exact, the participants reasoned and reflected a lot on how they experienced an internal conflict and had to deal with it, when their emotions were contradictory, 'not in balance' (Faith), to their motivations and cognitions (e.g., health attitudes). For example, with Becky, a negative reciprocal relation between cognitions (e.g., negative attitudes towards alcoholism and smoking)

and emotions (anticipation of smoking and binge drinking with friends) was a characteristic feature.

Positive examples of 'balanced' behaviours were less frequent. For example, Alice described experiencing positive outcomes with her multiple health behaviours when her cognitions, emotions, and motivations were congruent for her alcohol drinking: "It's just fun like (intrinsic motivation)… and I know my limits and everything (positive health empowerment), and I feel happy (emotions), so I know that I'm fine to go and have a good time with my friends (outcome)".

Multiple health behaviours can be self-regulated by *exercising self-control*. Self-control was found to be in the centre of self-regulation mechanism for all the participants. For instance, Eva's self-control helped her regulate her smoking, 'keep the balance' and integrate it with other behaviours: "I guess everything that is healthy about me I do have control over, I do have control over the way I cook, I do have control over smoking, and I do have control over of how much I drink, I do have control over how much I exercise, all of that, so I guess having self control does relate to healthy for me." Self-control (understood as a spiritual, physical and emotional entity) also helped Danny regulate his binge drinking with other behaviours (physical activity and healthy eating): "…self-control to me is the true show case of strength, like you can be physically strong, but it's more important for me to be strong… like mind, body, and soul. If you don't have those three things going for you, then, like if I give up on my workouts I become progressively hurt, that was the most obvious. But if I am lack of self-control, my weakness maybe comes from doing things because of being pressured by other people like doing drugs, doing more alcohol, doing more of these."

Multiple health behaviours can be self-regulated by *making up for one health behavior*

via another. Physical activity was often referred to in this context by the participants (Alice, Becky, Colton, Eva). Most often, it was used to make up for the infrequency or failures in healthy eating. For example, Eva did not worry much about her junk food eating "because I know that I am eating healthy … and I know I am exercising". Meanwhile, Colton after enjoying the pizza knew that he had to 'keep the exercise up'.

Multiple health behaviours can be self-regulated via a *cognitive split of negative concepts*. Cognitive regulation via splitting the concept into negative and positive (or not so harmful, or occasional) types of behaviours proved to be an effective regulatory strategy behind multiple health behaviours coexistence and helped them avoid cognitive dissonance. Eva differentiated between smoking as an addiction and occasional smoking to get "the little cigarette buzz", Becky spoke about occasional smoking versus chain smoking. Alcohol drinking was split into positive social drinking and negative binge drinking by Alice, and into social drinking versus alcoholism by Becky. Danny differentiated between drinking for health: "I do believe that a certain amount of a day or a week is healthy…", social drinking and excessive drinking. And with Colton (controlled versus addiction), it resulted in occasional binge drinking becoming part of his healthy lifestyle:"Personally I don't mind drinking in excess every once in awhile. I find it alright".

In summary, between-case analysis provided evidence and useful insights into how multiple health behaviours could coexist within an individual and what the elements of those generative regulation mechanisms could be.The results were context-specific and had an explanatory power. However, it was difficult to say if they could relate to the whole student population or only to the segment of those who self-selected for the interviews in Study 2. It has been previously mentioned that all interviewees were relatively healthy, engaged in both health-

risk and health-maintenance practices and could successfully combine and regulate them.

Study 2 Discussion

The analysis of interviewees' perceptions and reasoning provide useful insight into how multiple health behaviours can coexist within one individual. The results suggest that a common regulation system may underlie their coexistence. Within it, cognitions and incoming emotions are contributing factors alongside motivations, and their relations can define the behaviour impact on health outcomes and create or eliminate an internal conflict in the process. If motivations, cognitions and emotions are balanced, an individual experiences no conflict and the behaviour impact on health outcomes feels positive (which is often the case for physical activity). If the components are not in balance, that is contradictory and creating an internal conflict, self-control might be used to regulate the behaviour and integrate it with other health behaviours: "I would say self control ties back into making healthy decisions…"(Faith). Alternatively, the concept of health-risk behaviour (smoking or alcohol drinking) could be split into relatively positive and negative practices. Then, an individual feels healthy to be motivated, for example, for social drinking and against excessive drinking at the same time. Another form of self-regulation could be to make it up for one health behaviour via the other. For example, physical activity is often used to balance out the participants' 'lee ways' with alcohol drinking or unhealthy eating. While these findings are supported by some previous research on physical activity and healthy eating (Mata, et al., 2009; Redish, 2013), the results are still limited and inconclusive requiring further investigation into observed effects.

At the level of motivational regulations, it is an important finding that both motivations for and against the same health behaviour coexist. For example, the structure of motivation for drinking can be very extensive and include the components of controlled, autonomous and

intrinsic motivations for (social) drinking and controlled, autonomous and intrinsic motivations against excessive drinking. All of these components can be interrelated and the participants can perceive that they are complementing each other and, therefore, cannot be separated: "They interconnect because… like for me [physical activity] is really fun and I really do enjoy doing it. But I also at the same time know how important it is" (Danny). Study 2 results also provide evidence that the components form a hierarchy in which one (or rarely two) motivation(s) are leading. For instance, the hierarchy for healthy eating is most consistent across cases and all the interviewees single out autonomy to be their leading motivation. Previous research indicates that motivation tends to develop in time (Lavigne, et al., 2009; Vallerand & Rattelle, 2002). The current study details that for smoking, alcohol drinking, and healthy eating, it starts with the controlled component (often under the influence of health practices established at home) and then intrinsic and autonomous motivations develop. Physical activity is different in that intrinsic component develops early in life and then controlled and autonomous motivations emerge. The analysis of the data also suggests that both intrinsic and autonomous components are necessary for turning any health behaviour into a lifestyle habit.

Between-case analysis also suggests that within multiple health behaviour clusters each behaviour can have its own distinctive features of regulation (in terms of leading components and patterns of relations among motivations, emotions, cognitions, and social context). Research on health behaviour classification (McEachan, Lawton, & Conner, 2010) supports such conclusions in that health behaviours are always found different in at least one dimension. For example, smoking is more 'problematic and public' compared to alcohol drinking, and physical activity offers 'immediate pay-offs' in contrast to 'long-term pay-offs' of eating healthy.

Another important finding of Study 2 is that emotional regulations are closely linked to

motivations and cognitions in hypothetical mechanisms of health behaviour regulation and together determine motivation formation and behaviour patterns (in terms of frequency and intensity). Given that the role of cognitions (health attitudes, perceived self-control, and competence) has been extensively studied in health and motivational research (Amoura, Berjot, & Gillet, 2014; Muraven, Gagne, & Rosman, 2008), additional inquiries are needed into the influence of emotions in the process. It is recognized that reasons for engaging in health behaviours can be nonconscious. For example, positive moods before social drinking were found to be predictive of higher enhancement motives (Mohr, et al., 2013). Difficulties with negative mood regulation were associated with solitary heavy drinking among college students (Gonzalez & Skewes, 2013), and fear appeals were found to be ineffective in smoking prevention campaigns (Ruiter, Kessels, Peters, & Kok, 2014). However, up to date, empirical evidence regarding emotional factors is still widely divergent and has little to no integration among numerous findings (Graham, et al., 2014; Hortop, Wrosch, & Gagne, 2013).

Social context demonstrates to be a powerful regulating factor too. For social and cultural reasons, it is often underestimated by the participants. For example, many interviewees start from describing their controlled motivation for drinking as "a little bit" to gradually acknowledging its strength: "... when I do have one [a drink] my buddies do leave me alone. They don't bug me in that way and then I can enjoy myself a bit more" (Danny). To find ways to deal with that pressure, they have to be inventive and exercise self-control. For instance, they choose responsible drinking, or volunteer to be a designated driver, or even cheat: "So I filled up my water bottle with Crystal Light and none of them could even tell the difference… and I was like, "O, its vodka and Crystal Light"(Alice). Family (in particular, family history and established practices) proves to be another influential but seldom recognized factor. The answer "that's the

way I was brought up" and illustrations from family history (e.g., lung cancer, weight problems, alcoholism, etc.) are typical. Still, these factors are never described as motivators ('reasons'). Such discrepancies are natural from the critical realist perspective and illustrate that people are not and cannot be omniscient about their motivations (Huberman & Miles, 1985), but they might change their mind and contradict their previous answers, or their motivations might change and naturally develop under the influence of the situation or previous experience.

Strengths and Limitations

The main strength of the case-based approach is its access to the experiences of students and causal relations in the regulation mechanisms of their multiple health behaviours in specific contexts. Importantly, it has the potential to study them as open systems, to add new relevant concepts and relations to the developed conceptual framework, and to provide validation for the existing ones and relationships among them. Moreover, Study 2 findings provide explanations or support for many of Study 1 results (they will be discussed in the next chapter) and, therefore, help overcome to some degree that limitation of Study 1 findings (no explanatory power).

Still, the model of the regulation mechanism of multiple health behaviours that would generalize to the whole population cannot be developed using case-based approach. From the critical realism perspective, it is impossible and has no practical utility. First, the research at the level of empirical can provide only imperfectly apprehensible knowledge about the real structure of health behaviours regulations. Second, individuals' reasoning is very important because it motivates people to respond according to it, but it is imperfect since people are not omniscient and can fail to articulate how and what is happening to them. Third, the knowledge about the real world abstract structures has no practical value without the knowledge about how those structures work and what their defining features are at a more concrete level of specific contexts

and populations. To answer the critic about the inability of case-based studies to generalize the results, Study 2 provides findings that, although limiting, can be useful for health promotion research to predict influences or develop interventions that could target specific individuals in specific contexts.

It is a common criticism that on top of researcher's bias (discussed in the introduction), case-based research is susceptible to verification bias, when researchers seek to find confirmation for their preconceived assumptions when conducting the analysis (Flyvbjerg, 2006; Potter & Hepburn, 2005). However, many case studies, including this research, prove otherwise The interviewees often 'correct' the researcher by providing their own definitions of the constructs and understandings of the phenomena. In the context of the current research, it was, for example, contrary to conventional understanding of motivations within SDT that the participants were simultaneously motivated for and against engagement in certain behaviours and that all their motivations were related.

Study 2 can be criticized for dependency on participants' perceptions and is prone to many biases, including social desirability and self-serving bias. However, this criticism is not valid from the critical realism perspective. It has been previously mentioned, that critical realists recognize social nature of knowledge, never treat it as complete or infallible, and therefore, always perceive knowledge to be 'contexualized' and a social product of particular circumstances and influences, personal biases including.

Chapter 5
GENERAL DISCUSSION AND CONCLUSIONS

The domain of health motivation calls for an increased attention from different disciplines, but existing theories remain essentially descriptive. They relate the relevant variables empirically, yet they offer little explanation about what activates and sustains coexistence of multiple health behaviours, including co-occurrence of health-risk and health-maintenance practices (Keatley, Clarke, & Hagger, 2013; Teixeira, et al., 2012; Tripathi & Samantaray, 2011). Methodologically, little inquiry has been made into what approaches, or combinations of approaches, would work best to explore the regulation of multiple health behaviours.

Variable-based and case-based approaches have been chosen to explore the coexistence (Research Question 1) and regulation mechanisms (Research Question 2) of smoking, alcohol drinking, physical activity, and healthy eating among Canadian university students. Self-Determination Theory and the critical realism paradigm have been utilized to analyse and make inferences about the findings.

The overarching research question for the present study has been about advantages and limitations of integrating different methodologies within the scope of one research project. Is this integration possible? Previous mixed method research suggests that it depends on whether the components of a mixed methods investigation are related to each other or whether they are largely independent of each other (S. Lee & Smith, 2012; Mengshoel, 2012). In the context of this study, the findings of variable-based and case-based approaches appear to link under certain conditions (discussed later in this chapter). To this end, the findings of the present research are discussed by combining the results of Study 1 and Study 2.

Coexistence of Multiple Health Behaviours

The research supports the previous findings (D'Lima, Pearson, & Kelley, 2012; Wells,

2013) that university students cannot be solely differentiated into those who lead a healthy lifestyle or those that do not. Studies 1 and 2 provide evidence that such behaviours as smoking and binge drinking can coexist with healthy eating and physical activity. There is also support from Study 1 that health behaviours tend to cluster in certain ways. The top clusters in the sample were 'alcohol drinking+physical activity+healthy eating', 'physical activity+healthy eating', and 'smoking+alcohol drinking+physical activity+ healthy eating".

Importantly, Study 2 explains some of the regulation mechanisms and conditions of multiple health behaviour co-occurrence. For example, multiple health behaviours are found to coexist in individuals without any conflict when their motivational, cognitive, emotional and social contextual regulations are balanced. Such balance could be achieved by exercising more self-control, making up for one health behaviour via another or avoiding cognitive dissonance by 'splitting up' a negative concept into positive and negative ones (e.g., occasional smoking to release stress versus harmful chain smoking).Some of these findings relate to the previous reports on the protective role of self-regulation in substance abuse (Quinn & Fromme, 2010), compensation effects of gateway health behaviours in college students (Nigg, et al., 2009) and the effect of self-control style to predict alcohol consumption (Kunzendorf, et al., 2010).

The results also provide some support for the assumption that individuals who are in a higher stage for one behavior are more likely to be in a higher stage for another behavior as well. For example, Study 1 finds positive correlations for smoking and alcohol consumption, physical activity and healthy eating, and Study 2 explains how they coexist. For example, smoking and alcohol drinking are part of a 'smoke and drink' socializing package, while physical activity and healthy eating are part of a healthy lifestyle: "That pretty much sums it up, just living a healthy lifestyle and eating right and getting your exercising" (Alice).

Interestingly, both studies provide support and some insights into why it is often reported that it is not easy to delineate social drinking from binge drinking in university students, especially in men (Gronkjaer, et al., 2013). Study 1 reports a strong correlation between frequency and intensity of alcohol consumption in men, but not in women. Then, Study 2 details that binge drinking for students can often take a form of a social organized event: "I guess as far as binge drinking goes, usually that happens when it's kind of like a planned event ...when I go out to like the lake or something with friends, it's almost expected that's kind of what's going to happen..." (Colton). Moreover, five drinks on one occasion (a conventional definition of binge drinking) can be perceived as moderate drinking: "I guess it depends on how bad of a night I had. Like if I only had like five on the night, then in the morning I'm usually alright but if I drink a lot more than that." (Colton).

Health Behaviour Regulations

Both studies provide evidence that motivation is the centre of the regulation mechanism and such results are supported by the previous literature, which repeatedly indicates motivation as a reliable predictor of health behaviours initiation and maintenance (Ohtomo, 2013; Silva, et al., 2010; Smit, Fidler, & West, 2011). The results also provide explanatory value to the previous empirical findings about motivational "spill-over effects" among contradictory health behaviours (Mata, et al., 2009; O'Dougherty, Kurzer, & Schmitz, 2011): Study 1 demonstrates that motivations for alcohol drinking, physical activity, and healthy eating are all positively correlated and Study 2 details how the participants perceive all their motivations to be interrelated.

Importantly, the hierarchical structure of motivation is found to combine antagonistic components (controlled, autonomous and intrinsic motivations in various combinations) working

simultaneously (Study 2); still, only the leading motivation (intrinsic for alcohol drinking and physical activity and autonomous for healthy eating) is found to predict the behaviour frequency (Study 1). Both methodological approaches support the SDT focus on motivation quality (types of motivations, structure and hierarchy) rather than quantity (strength and intensity) in capacity to adopt and sustain health behaviours (Teixeira, et al., 2012). In particular, the combination of intrinsic and autonomous motivations and the regularity of practice are found to produce and maintain a long-term positive effect (Study 2). In light of numerous empirical studies testifying short-term observed effects (six months or a year) rather than long-term effects (Brug, Oenema, & Ferreira, 2005; Cropsey, Jackson, Hale, Carpenter, & Stitzer, 2011; Farris, Ostafin, & Palfai, 2010; Ng, et al., 2012; O'Dougherty, et al., 2011; Pelletier, et al., 2004), these results might have implications for planning future health behaviour interventions.

Both methodological approaches provide evidence for the importance of cognitive regulations, health empowerment, and attitudes about the importance of health in particular. For example, Study 2 demonstrates self-control to be an important regulatory element, which is involved in planning, integration, and keeping in balance all health behaviours within an individual. Such findings are in line with the previous studies on self-regulatory efficacy (Chavarria, Stevens, Jason, & Ferrari, 2012; Jung, 2011; Oaten & Cheng, 2006), self-regulatory strategies (Umstattd, Saunders, Wilcox, Valois, & Dowda, 2006), self-regulatory cognitions (Scholz, Nagy, Gohner, Luszczynska, & Kliegel, 2009), and the role of self-control in the regulation process (Alquist & Baumeister, 2012; D'Lima, et al., 2012; Shmueli & Prochaska, 2009; Wills, Walker, Mendoza, & Ainette, 2006). Yet, the pivotal regulatory role of self-control can be argued, because some cross-cultural studies suggest that concepts such as self-control and sense of achievement can be very culturally specific and largely influenced by general cultural

motivational models. For example, self-control is socially desirable and has strong positive connotations in Western culture, but it is not regarded as such by Asian culture (Ohtomo, Hirose, & Midden, 2011).

Cognitive factors have long been recognized to determine whether or not an individual practices health behaviors (Posadzki, et al., 2010; Scholz, et al., 2009; Teitelman, et al., 2011). The relative importance of various cognitive factors in determining who performs various health behaviors constitutes the basis of different models. Such models have been labeled social cognition models (SCMs, such as health belief model, theory of planned behaviour, social cognitive theory, stage models of health behaviour) because of their focus on cognitive variables as the primary determinant of individual social behaviors. Each of these models emphasizes the rationality of human behavior and assumes that behavior is based upon elaborate, but subjective cost–benefit analysis of the likely outcomes of differing courses of action. It is assumed that individuals generally aim to maximize benefits and minimize costs in selecting a behavior. However, the findings show that the role of cognitions is inflated while the role of emotional factors is underestimated. For example, emotions can take over cognitions in situations of uncertainty or stress. The results of the current study provide some support for that. First, the role of incoming emotions emerges as an important factor in Study 2. Then, some interviewees detail on how stressful uncertain situations can make them forget about their health beliefs and their self-control and give in to, for example, smoking under the influence of negative emotions: "Um… I could start chain smoking….. a stressful situation that I don't know how to do deal with… like with… let's say my mother's on dialysis…" (Becky). The results of the current research (Study 2) also indicate that incoming emotions are related to motivational and cognitive components in the regulation mechanisms of multiple health behaviours. However, the health

literature (Bayot, Capafons, & Cardena, 1997; Magar, Phillips, & Hosie, 2008; Tice & Bratslavsky, 2000; Wills, et al., 2006) has little consensus on the role of feelings and emotions in the process (Bayot, et al., 1997; H. S. Lee, et al., 2012; Menninga, Dijkstra, & Gebhardt, 2011) and has hardly any research on the trinity of the concepts and their joint influence (Lawton, Conner, & McEachan, 2009; Ting, 2011; Trafimow, et al., 2004). To this end, the current study creates a possibility to bridge gaps between the research areas and springboard the future investigation of the problem.

The context-sensitive nature of health behaviours regulation has also been confirmed by the findings of both studies. In that, they echo previous psychological research on the social underpinnings of health behaviours (Seeley & Gardner, 2006; Umstattd, et al., 2006; Westmaas, Bontemps-Jones, & Bauer, 2010) and demonstrate the influence of social context (family, friends, and social norms) on motivations, cognitions, and even the frequency of health behaviours. For example, the family was found to support controlled motivation against smoking and binge drinking (Studies 1 and 2), to contain smoking frequency (Study 2), and to boost the participants' health empowerment (Studies 1 and 2).

Integration of Methodological Approaches to Study Health Behaviours

Previous mixed methods research advocates triangulation of quantitative and qualitative data to add to the validity of the findings (Mengshoel, 2012; O'Byrne, 2007; Ostlund, Kidd, Wengstrom, & Rowa-Dewar, 2011; Wisdom, et al., 2012). The current investigation details that comparisons should be done with caution. For example, the survey and the interview data for the same participant could be contrasted; or, statistical analyses and between-case analysis findings could be compared and synthesized into a bigger whole.

Prior research repeatedly records inconsistencies and contradictions between the data

collected using different methodologies and uses it as an argument against integration of such findings (Heaphy & Loue, 2010). However, the comparative analysis of the current study finds it beneficial to find the limitations of both approaches. For example, the Self-Regulation Questionnaire was found not to reflect the presence of antagonistic motivations and, hence, the score on this scale could not be a very good criterion for selecting interviewees with certain motivational characteristics. The comparisons with the interview findings highlighted this limitation of the questionnaire, implicating that a full range of motivations (both for and against the behaviour) should be measured by the scale in future research.

Other contradictions had important implications for how to develop conceptual frameworks in future studies. The participants could misinterpret the results because their understanding of the concept was different from how the researcher operationalized it. The complexity of the participants' real motivations could then be revealed in the interviews. For example, controlled motivations were often understood by the participants in terms of direct external pressure, such as peer enforcement, to the effect that the external influence was rejected in the survey for smoking (Becky and Eva), alcohol drinking (Colton, Danny, and Faith), and healthy eating (Colton): "...when I think of external pressures, I think of things such as peer pressure … I don't have problems with like [that]". One of the suggestions could be to provide the participants with more explanations during the survey sessions and draw their attention to the fact.

From the critical realism perspective, both methodological approaches investigated the empirical layer of health behaviours regulations. However, the statistical regularities, established among the variables from the conceptual framework, could not provide information on how and through the chain of what processes the variables worked together to produce the outcomes.

While Study 1 confirms the coexistence of multiple health behaviours and positive associations among their motivations, Study 2 offers explanations on how contradictory behaviours can be integrated and regulated within an individual. While Study 1 indicates that health empowerment might be important in regulation mechanisms, Study 2 provides explanations of its role in the self-regulation mechanisms. Although the findings can arguably reflect the mechanisms operating only in a particular subsample and context, there is a support in existing literature specifying positive effects of self-regulation (D'Lima, et al., 2012; Quinn & Fromme, 2010) and health empowerment (Spencer, 2013).

Thus, despite limitations, the integration of two methods has been beneficial, and the consilience between their results is in some respects important. Such results add to the validity and generalizability of the common findings and suggest further refinement of their methodological instruments. One of such results, for example, is that every health behaviour regulation has its own distinctive features, and it is impossible to generalize about health-risk versus health-maintenance regulations. This is a somewhat contradictory finding in light of the previous motivational research claiming otherwise (Klein-Hessling, Lohaus, & Ball, 2005; Mullan, Allom, Brogan, Kothe, & Todd, 2014), but it is substantiated by a consilience between the results of two different methodological approaches.

Strengths and Limitations

Strengths. Strengths specific to Studies 1 and 2 have been mentioned in the previous chapters. Strengths of integrating the two approaches are summarized here.

First, triangulation of different methods (variable-based and case-based approaches) was used, a measurement tool that is recognized to minimize respondent retrospection, and therefore is thought to yield more accurate data.

Second, methodological triangulation also added to a deeper understanding of the regulation mechanisms of multiple health behaviours and provided a more comprehensive picture of how smoking, alcohol drinking, physical activity, and healthy eating can coexist. Methods complimented each other in that Study1 provided reliable descriptions and accurate comparisons of the frequency of health behaviours, their motivations, related cognitions, and social contextual factors, and Study 2 identified processes that could underlie and regulate the coexistence of multiple behaviours.

Third, points of consilience between the findings, that is, the abstract statistical reality of Study 1 and the representation of reality of individuals' lives in Study 2 were considered to reflect the real elements of the regulation mechanism of multiple health behaviours. From the critical realists perspective, these causal mechanisms cannot be apprehended directly as they are not open to observation, but they can be inferred through a combination of empirical investigation and theory construction. Further, contradictions between the findings highlighted limitations of each methodological approach and indicated the directions to enhance the reliability and validity of each instrument (the survey and the interview).

Finally, findings from this study have practical implications for the development of effective health promotion initiatives and interventions among college students population. For example, the findings about the specific regulation mechanisms that balance the coexistence of contradictory behaviours, such as making up for one health behaviour via another, can help health educators to develop interventions targeting multiple health behaviours.

Limitations. Several limitations specific to the approaches used in Studies 1 and 2 have been discussed in the previous chapters. The limitations that were common to both parts of the project are addressed here.

First, there are accuracy and honesty limitations due to the self-report nature of Studies 1 and 2 and the inability to confirm whether the reported behavior and motivations were intentionally or unintentionally misreported. For example, students may have regarded time frames differently or they might have been not able to recall information accurately. Thus, findings should be treated accordingly.

Second, the reliability of the data obtained via self-reports can be questioned because they are recognized to be susceptible to a number of internal (such as mood or self-image) and external (such as social desirability, situation, and personality of the researcher) factors.

Third, the possibility and implications of self-selection bias in Study 1 and Study 2 cannot be ignored because the interviewees were selected by the researcher following the predetermined criteria, but it was the participants' choice to come to the survey sessions, or later, to accept the invitation for an interview.

Further limitation concerns the generalizability of the findings, because the sample could not be representative of undergraduate students. They were all recruited via Psychology Participant Pool, because they were taking a Psychology class. Moreover, some interviewees reported that they previously took a class in Nutrition which could be one of the explanations why the sample was relatively high on the frequency of healthy eating.

Lastly, the study does not address all typical health behaviours of university students. Drinking and driving, sexual behaviour and substance abuse are recommended to be addressed in future research.

Directions for Future Research

Mindful of indicated strengths and limitations, I would suggest the following directions for future research in the area.

Further development of the conceptual framework. On the one hand, further investigation is needed into the role of the following concepts in the regulation mechanisms of multiple health behaviours, such as social norms and the importance of social well-being, the range of emotions (positive, negative, and ambivalent, fear, happiness, guilt, and apprehension to name a few) that are involved in regulation and that can be very behaviour-specific, and multiple styles of self-control (Kunzendorf, et al., 2010; Menninga, et al., 2011). On the other hand, it is recommended that fewer concepts would be used in future analysis in order to more thoroughly address each potential relationship between the concepts. The recommendation could be to keep the same main constructs (motivations, cognitions, emotions and social context), but reduce the number of concepts within them to the most influential ones (e.g., health empowerment and the attitude about the importance of health appear to be more important in the regulation mechanism than other attitudes and perceptions).

Development of multiple health behaviour theory. Health motivation (or its components) has been included in many health behavior theories such as Protection Motivation Theory (Rogers, 1983; Rogers & Prentice-Dunn, 1997), Theory of Planned Behavior (Ajzen, 1985, 1988, 1991) and Health Action Process Approach (Schwarzer, 1992). None of them currently focuses on multiple health behaviour regulation which should be developed. A productive way could be to combine insights from multiple theories about changing single behaviors. People's experiences are multidimensional and are much more than a single theory can describe. People's actions, feelings, and thoughts intersect with issues of power, identity, meaning-making practices and material challenges, all at the same time. Thus, the research would undoubtedly benefit from integrating several content theories and developing an elaborate model of multiple health behaviours regulation. For example, SDT and the theory of planned

behaviour could be a winning combination judging by the previous findings in the field (Hagger & Chatzisarantis, 2009). Alternatively, the Transtheoretical Model can be integrated into the theory of multiple health behaviour regulation (J. J. Prochaska, Spring, & Nigg, 2008).

Elaboration and refinement of methodological apparatus. It was an advantage of the current research that contradictions in Studies 1 and 2 findings highlighted limitations of each methodological approach and suggested ways of their refinement. For example, they indicated for the survey that both health behaviour frequency during a typical month and the past 30 days should be inquired about to get information on possible fluctuations. Moreover, frequencies and motivations for those health behaviours that could be cognitively split into positive and negative practices (e.g., smoking and alcohol drinking) should be questioned separately. Importantly, the participants' 'reasons' for and against their health behaviours should be asked to get a fuller picture of their motivations. Finally, the scales assessing incoming emotions should be introduced into the survey.

As for the interviews, they should be designed as more construct-centred. Probably, the definitions of the constructs and the relations among motivations for different health behaviours should be discussed more openly with the participant, so that more evidence from the participants would be received to support or refute the researcher's assumptions. In the current study, only the motivations within single health behaviours were discussed with the participants and this strategy was effective and helped the analysis.

Still, the study of regulation mechanisms of multiple health behaviours is a multi-facet task and could benefit from applying new methods. For example, to study motivational flexibility and related mood fluctuations diaries or daily online entries could be used (Darlow & Lobel, 2012). Also, structural equation modelling could be applied when the complex phenomena is

sufficiently understood to warrant an attempt at generalisation to a population. Research indicates that this survey analysis is an appropriate technique to use within the critical realism paradigm. It models structures with complex interdependencies, and it explicitly allows for multi-item scales and some measurement error in its 'unobservable'' constructs (Healy & Perry, 2000)

Critical realism application to health research. Most importantly, the practical and methodological application of the critical realism philosophical approach should be further developed within health research. The results of the current study, supported by the prior literature (Angus & Clark, 2012; Cruickshank, 2012), indicate that critical realism's ontological and epistemological multiplicity and multidimensionality can be appropriate and helpful for understanding the reality of health behaviours regulation at the level of individuals. In particular, this analytical framework allows drawing causal explanations that are based not on empirical regularities but on references to real unobservable structures, such as underlying regulation mechanism. However, critical realism in the role of an analytical framework, still calls for more inquiry because its methodological side is not well developed yet in terms of how to structure and analyse the interviews, deal with conflicting data, compare and generalize case results and make conclusions about unobservable mechanisms (Bergene, 2007).

Conclusions

Growing evidence suggests the potential for multiple health behavior interventions to have a greater impact on public health than single behavior interventions. However, there exists surprisingly little understanding of how multiple health behaviours coexist and can be regulated. This study provides some useful insights into how smoking, alcohol drinking, physical activity and healthy eating can coexist and be self-regulated within an individual. Its theoretical and

methodological value is in integrating variable-based and case-based approaches and extending the knowledge of motivational research. It describes how motivations form a hierarchical structure across and within health behaviours. It provides detail on how cognitive, emotional and social contextual factors can influence motivations. Importantly, the critical realism paradigm allows one to understand and explain how these regulations can function within individuals in specific contexts.

Alongside the theoretical value, this study is practically important. Its findings about the predictive power of autonomous and intrinsic motivations for health behaviour and descriptions of specific regulation mechanisms that can balance the coexistence of contradictory behaviours within university students (e.g., by making up for one health behaviour via another, or avoiding cognitive dissonance via 'splitting up' a negative concept into positive and negative ones) can help health educators to prioritize interventions, to decide which students to target and how to tailor those interventions.

REFERENCES

Adams, T. B., & Colner, W. (2008). The association of multiple risk factors with fruit and vegetable intake among a nationwide sample of college students. *Journal of American College Health, 56*(4), 455-461.

Adams, T. B., & Mowan, J. C. (2005). Identifying the personality characteristics of healthy eaters and exercisers: A hierarchical model approach. *Health Marketing Quarterly, 23*(1), 21-42.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.

Alquist, J. L., & Baumeister, R. F. (2012). Self-control and addiction. In H. J. Shaffer, D. A. LaPlante & S. E. Nelson (Eds.), *APA addiction syndrome handbook* (Vol. 1: Foundations, influences, and expressions of addiction, pp. 165-174). Washington, DC, US: American Psychological Association.

American College Health Association. (2013). *American College Health Association-National College Health Assessment II: Candian Reference Group Executive Summary Spring 2013*. Hanover, MD: American College Health Association.

Amoura, C., Berjot, S., & Gillet, N. (2014). Desire for control, perception of control: their impact on autonomous motivation and psychological adjustment. *Motivation and Emotion, 38*(3), 323-335.

Anderson, J. (in press). Exploring the mechanism of academic motivation: an integration of self-determination and achievement goal theories from a critical realist perspective. *Dissertation Abstracts International Section A: Humanities and Social Sciences*.

Angus, J. E., & Clark, A. M. (2012). Using critical realism in nursing and health research: promise and challenges. *Nursing Inquiry, 19*(1), 1-3.

Armstrong, D., Gosling, A., Weinman, J., & Marteau, T. (1997). The place of inter-rater reliability in qualitative research: An empirical study. *Sociology, 31*, 597-606.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barbour, R. S. (2001). Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *British Medical Journal, 322*, 1115-1117.

Bayot, A., Capafons, A., & Cardena, E. (1997). Emotional self-regulation therapy: A new and efficacious treatment for smoking. *American Journal of Clinical Hypnosis, 40*(2), 146-156.

Bennett, P., Conner, M., & Godin, G. (2004). Changing behaviour to improve health. In S. Michie & C. Abraham (Eds.), *Health psychology in practice* (pp. 267-284). Malden: Blackwell Publishing.

Bergene, A. C. (2007). Towards a critical realist comparative methodology: A context-sensitive theoretical comparison. *Journal of Critical Realism, 6*(1), 5-27.

Bhaskar, R. (1993). *Dialectic: the pulse of freedom*. London: Verso.

Bhaskar, R. (1997). *A realist theory of science*. London: Verso.

Boiche´, J. C. S., Sarrazin, P. G., Grouzet, F. M. E., Pelletier, L. G., & Chanal, J. P. (2008). Students' motivational profiles and achievement outcomes in physical education: A self-determination perspective. *Journal of Educational Psychology, 100*, 688-701.

Bray, S. R., & Born, H. A. (2004). Transition to university and vigorous physical activity: Implications for health and psychological well-being. *Journal of American College of Health, 52*, 181-188.

Brug, J., Oenema, A., & Ferreira, I. (2005). Theory, evidence and intervention mapping to improve behavior nutrition and physical activity interventions. *International Journal of Behavioral Nutrition and Physical Activity, 2*(2).

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research, 1*(1), 8-22.

Burke, S. M. (2008). The role of social context in relation to exercise promotion and adherence. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 68*(9-B), 5886.

Butler, K. M., Rayens, M. K., Zhang, M., & Hahn, E. J. (2011). Motivation to quit smoking among relatives of lung cancer patients. *Public Health Nursing, 28*(1), 43-50.

Butler, S. M., Black, D. R., Blue, C. L., & Gretebeck, R. J. (2004). Change in diet, physical activity, and body weight in female college freshman. *American Journal of Health Behaviors, 28*, 24-32.

Canadian Centre on Substance Abuse. (2013). Canada's low-risk alcohol drinking guidelines. Retrieved from http://www.ccsa.ca/Resource%20Library/2012-Canada-Low-Risk-Alcohol-Drinking-Guidelines-Brochure-en.pdf

Centers for Disease Control and Prevention. (2008). Youth risk behavior surveillance - United States, 2007. *Morbidity and Mortality Weekly Report, 57*(SS04), 1-131.

Chavarria, J., Stevens, E. B., Jason, L. A., & Ferrari, J. R. (2012). The effects of self-regulation and self-efficacy on substance use abstinence. *Alcoholism Treatment Quarterly, 30*(4), 422-432.

Chirkov, V., Lebedeva, N., Molodtsova, I., & Tatarko, A. (2011). Social capital, motivational autonomy and health-related behaviour in Canadian and Russian Youth. In D. Chadee & A. Kostic (Eds.), *Social psychological dynamics* (pp. 211-240). Jamaika, Barbados, Trinidad and Tobago: University of the West Indies Press.

Chirkov, V., Ryan, R. M., & Willness, C. (2005). Cultural context and psychological needs in Canada and Brazil: Testing a self-determination approach to internalization of cultural practices, identity and well-being. *Journal of Cross-Cultural Psychology, 36*(6), 425-443.

Cohen, S. (2004). Social relationships and health. *The American Psychologist, 59*(8), 676-684.

Committee on Health and Behavior: Research, P. a. P., Board on Neuroscience and Behavioral Health. (2001). *Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences*. Washington, D.C.: National Academy Press.

Cooper, B., Glaesser, J., Gomm, R., & Hammersley, M. (2012). *Challenging the qualitative-quantitative divide: Explorations in case-focused causal analysis*. London: Continuum.

Cropsey, K. L., Jackson, D. O., Hale, G. J., Carpenter, M. J., & Stitzer, M. L. (2011). Impact of

self-initiated pre-quit smoking reduction on cessation rates: results of a clinical trial of smoking cessation among female prisoners. *Addictive Behaviors, 36*(1-2), 73-78.

Cruickshank, J. (2012). Positioning positivism, critical realism and social constructionism in the health sciences: a philosophical orientation. *Nursing Inquiry, 19*(1), 71-82.

D'Lima, G. M., Pearson, M. R., & Kelley, M. L. (2012). Protective behavioral strategies as a mediator and moderator of the relationship between self-regulation and alcohol-related consequences in first-year college students. *Psychology of Addictive Behaviors, 26*(2), 330-337.

Danemark, B., Ekstrom, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining society: Critical realism in the social sciences*. London: Routledge.

Darlow, S., & Lobel, M. (2012). Smoking behavior and motivational flexibility in light and heavy smokers. *Addictive Behaviors, 37*, 668-673.

De Ridder, D. T. F., & De Wit, J. B. F. (2006). Self-regulation in health behaviour: Concepts, theories, and central issues. In D. T. F. De Ridder & J. B. F. De Wit (Eds.), *Self-regulation in health behaviour* (pp. 1-24). Chichester: Wiley.

de Silva-Sanigorski, A. M., Bolton, K., Haby, M., Kremer, P., Gibbs, L., Waters, E., et al. (2010). Scaling up community-based obesity prevention in Australia: background and evaluation design of the Health Promoting Communities: Being Active Eating Well initiative. *BMC Public Health, 10*, 65.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The ‘‘what’’ and the ‘‘why’’ of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227-268.

Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press.

Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology/Psychologie canadienne, 49*(1), 14-23.

Dinger, M. K., & Waigandt, A. (1997). Dietary intake and physical activities behaviors of male and female college students. *American Journal of Health Promotion, 11*, 360-362.

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2009). Helping your clients and patients take ownership over their exercise: Fostering exercise adoption, adherence and associated well-being. *ACSM's Health and Fitness Journal, 13*, 20-25.

Emmons, R. A. (1991). Personal strivings, daily life events, and psychological and physical well-being. *Journal of Personality, 59*, 453-472.

Everson-Hock, E. S., Taylor, A. H., Ussher, M., & Faulkner, G. (2010). A qualitative perspective on multiple health behaviour change: Views of smoking cessation advisors who promote physical activity. *Journal of Smoking Cessation, 5*(1), 7-14.

Farris, S. R., Ostafin, B. D., & Palfai, T. P. (2010). Distractibility moderates the relation between automatic alcohol motivation and drinking behavior. *Psychology of Addictive Behaviors, 24*(1), 151-156.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Satistical power analysis using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160.

Ferrand, C., Nasarre, S., Hautier, C., & Bonnefoy, M. (2012). Aging and well-being in French older adults regularly practicing physical activity: a self-determination perspective. *Journal of Aging and Physical Activity, 20*(2), 215-230.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry, 12*(2), 219-245.

Foster, D. W., & Neighbors, C. (2013). Self-consciousness as a moderator of the effect of social drinking motives on alcohol use. *Addictive Behaviors, 38*(4), 1996-2002.

Frazier, D. A. (2007). The link between fast food and the obesity epidemic. *Health Matrix: Journal of Law Medicine, 77*(1), 291-317.

Galambos, N. L., & Tilton-Weaver, L. C. (1998). Multiple-risk behaviour in adolescents and young adults. *Health Reports. Statistics Canada, Catalogue no. 82-003, 10*(2), 9-20.

Gibson, C. (1991). A concept analysis of empowerment. *Journal of Advanced Nursing, 16*(3), 354-361.

Gonzalez, V. M., & Skewes, M. C. (2013). Solitary heavy drinking, social relationships, and negative mood regulation in college drinkers. *Addiction Research & Theory, 21*(4), 285-294.

Graham, J. D., Bray, S. R., & Martin Ginis, K. A. (2014). "Pay the piper": It helps initially, but motivation takes a toll on self-control. *Psychology of Sport and Exercise, 15*(1), 89-96.

Grant, A. M., Brown, B., & Moreno, M. A. (2013). The disparity between social drinking movies and social outcomes: A new perspective on college student drinking. *College Student Journal, 47*(1), 96-101.

Greene, K., & Brinn, L. S. (2003). Messages influencing college women's tanning bed use: Statistical versus narrative evidence format and a self-assessment to increase perceived susceptibility. *Journal of Health Communication, 8*, 443-461.

Gritz, E. R., Prokhorov, A. V., Hudmon, K. S., Chamberlain, R. M., Taylor, W. C., & DiClemente, C. C. (1998). Cigarette smoking in a multiethnic population of youth: Methods and baseline findings. *Preventive Medicine, 27*, 365-384.

Gronkjaer, M., Curtis, T., de Crespigny, C., & Delmar, C. (2013). Drinking contexts and the legitimacy of alcohol use: Findings from a focus group study on alcohol use in Denmark. *Scandinavian Journal of Public Health, 41*(3), 221-229.

Grund, A. (2013). Motivational profiles in study-leisure conflicts: Quality and quantity of motivation matter. *Learning and Individual Differences, 26*, 201-211.

Guba, E., & Lincoln, Y. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of Qualitative Research*. Newbury Park, CA: Sage Publications.

Guerin, E., Bales, E., Sweet, S., & Fortier, M. (2012). A meta-analysis of the influence of gender on self-determination theory's motivational regulations for physical activity. *Canadian Psychology/Psychologie canadienne, 53*(4), 291-300.

Hagger, M. S. (2010). Self-regulation: An important construct in health psychology research and practice. *Health Psychology Review, 4*, 57-65.

Hagger, M. S., & Chatzisarantis, N. L. (2009). Integrating the theory of planned behaviour and self-determination theory in health behaviour: A meta-analysis. *British Journal of Health Psychology, 14*(2), 275-302.

Hagger, M. S., Hardcastle, S. J., Chater, A., Mallett, C., Pal, S., & Chatzisarantis, N. L. D. (2014). Autonomous and controlled motivational regulations for multiple health-related behaviors: between and within-participants analyses. *Health Psychology and Behavioural Medicine: An Open Access Journal, 2*(1), 565-601.

Healy, M., & Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research: An International Journal, 3*(3), 118-126.

Heaphy, E. L., & Loue, S. (2010). Comparing two approaches to acquiring HIV-risk data from Puerto Rican women with severe mental illness. *Journal of Immigrant and Minority Health, 12*(1), 74-82.

Hortop, E. G., Wrosch, C., & Gagne, M. (2013). The why and how of goal pursuits: Effects of global autonomous motivation and perceived control on emotional well-being. *Motivation and Emotion, 37*(4), 675-687.

Hsu, Y.-T. (2012). The effects of a self-determination theory based exercise intervention on physical activity and psychological variables in sedentary overweight or obese women: Project CHANGE (to being a Confident, Healthy, And Goal-directed Exerciser). *Dissertation Abstracts International Section A: Humanities and Social Sciences, 73*(2-A), 488.

Huberman, A. M., & Miles, M. B. (1985). Assessing local causality in qualitative research. In D. N. Berg & K. K. Smith (Eds.), *Exploring clinical methods for social research* (pp. 351-382). Beverly Hills, CA: Sage.

Ingledew, D. K., & Markland, D. (2008). The role of motives in exercise participation.

Psychology & Health, 23, 807-828.

The integrated pan-Canadian healthy living strategy. (2005). Retrieved May, 24, 2009, from http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

Jung, M. E. (2011). Concurrent management of exercise and other valued life goals: A focus on self-regulatory efficacy. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 71*(10-B), 6489.

Katz, A., Davis, P., & Scott-Findlay, S. (2002). Ask and ye shall plan—A health needs assessment of a university population. *Canadian Journal of Public Health, 93*, 63-66.

Keatley, D., Clarke, D. D., & Hagger, M. S. (2013). The predictive validity of implicit measures of self-determined motivation across health-related behaviours. *British Journal of Health Psychology, 18*(1), 2-17.

Khuder, S. A., Dayal, H. H., & Mutgi, A. B. (1999). Age at smoking onset and its effect on smoking cessation. *Addictive Behaviors, 24*, 673-677.

Klein-Hessling, J., Lohaus, A., & Ball, J. (2005). Psychological predictors of health-related behaviour in children. *Psychology, Health & Medicine, 10*(1), 31-43.

Kowal, J., & Fortier, M. S. (1999). Motivational determinants of flow: Contributions from self-determination theory. *The Journal of Social Psychology, 139*, 355-368.

Kubacki, K., Siemieniako, D., & Rundle-Thiele, S. R. (2011). College binge drinking: a new approach. *Journal of Consumer Marketing, 28*(3), 225-233.

Kunzendorf, R. G., Turgiss, J., Benson, J., Ostler, C., Walsh, E., Sawyer, R., et al. (2010). Multiple styles of self-control predict college students' alcohol consumption. *Imagination, Cognition and Personality, 30*(2), 185-199.

Lavigne, G. L., Hauw, N., Vallerand, R. J., Brunel, P., Blanchard, C., Cadorette, I., et al. (2009). On the dynamic relationships between contextual (or general) and situational (or state) motivation toward exercise and physical activity: A longitudinal test of the top-down and bottom-up hypothesis. *International Journal of Sport and Exercise Psychology, 7*(2), 147-168.

Lawton, R., Conner, M. T., & McEachan, R. (2009). Desire or reason: Predicting health behaviors from affective and cognitive attitudes. *Health Psychology, 28*, 56-65.

Lee, H. S., Catley, D., & Harris, K. J. (2012). A comparison of autonomous regulation and negative self-evaluative emotions as predictors of smoking behavior change among college students. *Journal of Health Psychology, 17*(4), 600-609.

Lee, S., & Smith, C. A. (2012). Criteria for quantitative and qualitative data integration: mixed-methods research methodology. *Computers, Informatics, Nursing, 30*(5), 251-256.

Lindsay, J. (2009). Young Australians and the staging of intoxication and self-control. *Journal of Youth Studies, 12*(4), 371-384.

Lippke, S., Nigg, C. R., & Maddock, J. E. (2012). Health-promoting and health-risk behaviors: Theory-driven analyses of multiple health behavior change in three international samples. *International Journal of Behavioral Medicine, 19*, 1-13.

Low, J., & Thériault, L. (2000). Health promotion policy in Canada: Lessons forgotten, lessons still to learn. *Health Promotion International, 23*, 200-206.

Lyvers, M., Simons, O., Hayes, A., & Thorberg, F. A. (2014). Drinking motives, alcohol expectancies and alexithymia in young adult social drinkers. *Journal of Substance Use, 19*(1-2), 44-47.

MacNeela, P., & Bredin, O. (2011). Keeping your balance: Freedom and regulation in female university students' drinking practices. *Journal of Health Psychology, 16*(2), 284-293.

Magar, E. C., Phillips, L. H., & Hosie, J. A. (2008). Self-regulation and risk-taking. *Personality and Individual Differences, 45*(2), 153-159.

Makrides, L., Veinot, P., Richard, J., McKee, E., & Gallivan, T. (1998). A cardiovascular health needs assessment of university students living in residence. *Canadian Journal of Public Health, 89*, 171-175.

Markland, D., Ryan, R. M., Tobin, V. J., & Rollnick, S. (2005). Motivational interviewing and self-determination theory. *Journal of Social and Clinical Psychology, 24*, 811-831.

Mata, J., Silva, M. N., Vieira, P. N., Carraca, E. V., Andrade, A. M., Coutinho, S. R., et al.

(2009). Motivational "spill-over" during weight control: increased self-determination and exercise intrinsic motivation predict eating self-regulation. *Health Psychology, 28*(6), 709-716.

Maxwell, J. A. (2012). *A realist approach for qualitative research*. Thousand Oaks, CA: Sage.

McClure, J. B., Divine, G., Alexander, G., Tolsma, D., Rolnick, S. J., Stopponi, M., et al. (2009). A comparison of smokers' and nonsmokers' fruit and vegetable intake and relevant psychosocial factors. *Behavioral Medicine, 35*(1), 14-22.

McDowell, I., & Newell, C. (1996). *Measuring health: A guide to rating scales and questionnaires*. Oxford, England: Oxford University Press.

McEachan, R., Lawton, R., & Conner, M. (2010). Classifying health-related behaviours: Exploring similarities and differences amongst behaviours. *British Journal of Health Psychology, 15*, 347-366.

Mellen, K. (2008). Health behaviors of college students: Sample comparisons, physical activity associations, and a physical activity intervention. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 69*(2-B), pp. 913.

Mengshoel, A. M. (2012). Mixed methods research - So far easier said than done? *Manual Therapy, 17*(4), 373-375.

Menninga, K. M., Dijkstra, A., & Gebhardt, W. A. (2011). Mixed feelings: Ambivalence as a predictor of relapse in ex-smokers. *British Journal of Health Psychology, 16*(3), 580-591.

Mickens, L., Greenberg, J., Ameringer, K. J., Brightman, M., Ping, S., & Leventhal, A. M. (2011). Associations between depressive symptom dimensions and smoking dependence motives. *Evaluation & the Health Professions, 34*(1), 81-102.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Mohr, C. D., Brannan, D., Wendt, S., Jacobs, L., Wright, R., & Wang, M. (2013). Daily mood-drinking slopes as predictors: A new take on drinking motives and related outcomes. *Psychology of Addictive Behaviors, 27*(4), 944-955.

Moore, M. J., & Werch, C. E. (2008). Relationship between vigorous exercise frequency and substance use among first-year drinking college students. *Journal of American College Health, 56*(6), 686-690.

Moran, S., Wechsler, H., & Rigotti, N. A. (2004). Social smoking among US college students. *Pediatrics, 114*, 1028-1034.

Morgan, A., & Swann, C. (Eds.). (2004). *Social capital for health: Issues of definition, measurement and links to health*. London: Health Development Agency.

Mullan, B., Allom, V., Brogan, A., Kothe, E., & Todd, J. (2014). Self-regulation and the intention behaviour gap. Exploring dietary behaviours in university students. *Appetite, 73*, 7-14.

Muraven, M., Gagne, M., & Rosman, H. (2008). Helpful self-control: Autonomy support, vitality, and depletion. *Journal of Experimental Social Psychology, 44*, 573-585.

Nademin, M. E., Napolitano, M. A., Xanthopoulos, M. S., Fava, J. L., Richardson, E., & Marcus, B. (2010). Smoking cessation in college-aged women: A qualitative analysis of factors important to this population. *Addiction Research and Theory, 18*(6), 649-666.

Nelson, C. C., Sapp, A., Berkman, L. F., Li, Y., & Sorensen, G. (2011). Allocation of household responsibilities influences change in dietary behavior. *Social Science & Medicine, 73*(10), 1517-1524.

Nelson, M. C., Lust, K., Story, M., & Ehlinger, E. P. (2009). Alcohol use, eating patterns and behaviors in a university population. *American Journal of Health Behavior, 33*(3), 227-237.

Ng, J. Y., Ntoumanis, N., Thogersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., et al. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science, 7*(4), 325-340.

Nichter, M., Nichter, M., Carkoglu, A., Lloyd-Richardson, E., & the Tobacco Etiology Research Network (TERN). (2010). Smoking and drinking among college students: "It's a package deal". *Drug and Alcohol Dependence, 106*, 16-20.

Niemiec, C. P., Ryan, R. M., Deci, E. L., & Williams, G. C. (2009). Aspiring to physical health: the role of aspirations for physical health in facilitating long-term tobacco abstinence. *Patient Education and Counseling, 74*(2), 250-257.

Nigg, C. R., Lee, H. R., Hubbard, A. E., & Min-Sun, K. (2009). Gateway health behaviors in college students: Investigating transfer and compensation effects. *Journal of American College Health, 58*(1), 39-44.

Niland, P., Lyons, A. C., Goodwin, I., & Hutton, F. (2013). "Everyone can loosen up and get a bit of a buzz on": Young adults, alcohol and friendship practices. *International Journal of Drug Policy, 24*(6), 530-537.

Noar, S. M., Chabot, M., & Zimmerman, R. S. (2008). Applying health behavior theory to multiple behavior change: Considerations and approaches. *Preventive Medicine, 46*(3), 275-280.

Nocon, M., Keil, T., & Willich, S. N. (2007). Education, income, occupational status and health risk behaviour. *Journal of Public Health, 15*(5), 401-405.

O'Byrne, P. (2007). The advantages and disadvantages of mixing methods: an analysis of combining traditional and autoethnographic approaches. *Qualitative Health Research, 17*(10), 1381-1391.

O'Dougherty, M., Kurzer, M. S., & Schmitz, K. H. (2011). Shifting motivations: Young women's reflections on physical activity over time and across contexts. *Health Education and Behavior, 37*(4), 547-567.

Oaten, M., & Cheng, K. (2006). Longitudinal gains in self-regulation from regular physical exercise. *British Journal of Health Psychology, 11*(4), 717-733.

Ohtomo, S. (2013). Effects of habit on intentional and reactive motivations for unhealthy eating. *Appetite, 68*, 69-75.

Ohtomo, S., Hirose, Y., & Midden, C. J. (2011). Cultural differences of a dual-motivation model on health risk behaviour. *Journal of Risk Research, 14*(1), 85-96.

Osler, M. (1998). The food intake of smokers and nonsmokers: the role of partner's smoking

behavior. *Preventive Medicine, 27*, 438-443.

Ostlund, U., Kidd, L., Wengstrom, Y., & Rowa-Dewar, N. (2011). Combining qualitative and quantitative research within mixed method research designs: A methodological review. *International Journal of Nursing Studies, 48*(3), 369-383.

Palmeira, A. L., Teixeira, P. J., Branco, T. L., Martins, S. S., Minderico, C. S., Barata, J. T., et al. (2007). Predicting short-term weight loss using four leading health behavior change theories. *International Journal of Behavioral Nutrition and Physical Activity, 4*(14).

Pawson, R., & Tilley, N. (1997). *Realistic evaluation*. London: Sage Publications.

Pelletier, L. G., Dion, S. C., Slovinec D'Angelo, M. E., & Reid, R. (2004). Why do you regulate what you eat? Relationships between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment. *Motivation and Emotion, 28*(3), 245-277.

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Briere, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study. *Motivation and Emotion, 25*, 279-306.

Peterson, K. E., Dubowitz, T., Stoddard, A. M., Troped, P. J., Sorensen, G., & Emmons, K. M. (2007). Social context of physical activity and weight status in working-class populations. *Journal of Physical Activity & Health, 4*(4), 381-396.

Piasecki, T. M., Piper, M. E., & Baker, T. B. (2010). Tobacco dependence: Insights from investigations of self-reported motives. *Current Directions in Psychological Science, 19*(6), 395-401.

Posadzki, P., Stockl, A., Musonda, P., & Tsouroufli, M. (2010). A mixed-method approach to sense of coherence, health behaviors, self-efficacy and optimism: towards the operationalization of positive health attitudes. *Scandinavian Journal of Psychology, 51*(3), 246-252.

Potter, J., & Hepburn, A. (2005). Qualitative interviews in psychology: Problems and possibilities. *Qualitative Research in Psychology, 2*, 281-307.

Prochaska, J. J., Spring, B., & Nigg, C. R. (2008). Multiple health behavior change research: An introduction and overview. *Preventive Medicine, 46*, 181-188.

Prochaska, J. O., & DiClemente, C. C. (2005). The transtheoretical approach. In J. C. Norcross & M. R. Goldfried (Eds.), *Handbook of psychotherapy integration*. New York: Oxford University Press.

Quinn, P. D., & Fromme, K. (2010). Self-regulation as a protective factor against risky drinking and sexual behavior. *Psychology of Addictive Behaviors, 24*(3), 376-385.

Quinn, P. D., & Fromme, K. (2011). Alcohol use and related problems among college students and their noncollege peers: The competing roles of personality and peer influence. *Journal of Studies on Alcohol and Drugs, 72*(4), 622-632.

Quintiliani, L. M., Allen, J., Marino, M., Kelly-Weeder, S., & Li, Y. (2010). Multiple health behavior clusters among female college students. *Patient Education and Counseling, 79*(1), 134-137.

Racette, S. B., Deusinger, S. S., Strube, M. J., Highstein, G. R., & Deusinger, R. H. (2005). Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. *Journal of American College of Health, 53*, 245-251.

Redden, J. P., & Haws, K. L. (2013). Healthy satiation: The role of decreasing desire in effective self-control. *Journal of Consumer Research, 39*(5), 1100-1114.

Redish, A. (2013). *The mind within the brain: How we make decisions and how those decisions go wrong*. Oxford: Oxford University Press.

Reed, M. I. (2009). Critical realism: Philosophy, method, or philosophy in search of a method? In D. A. E. Buchanan & A. E. Bryman (Eds.), *The Sage handbook of organizational research methods* (pp. 430-448). Thousand Oaks, CA: Sage Publications Ltd.

Rocco, L., & Suhrcke, M. (2012). *Is social capital good for health? A European perspective*. Copenhagen: WHO Regional Office for Europe.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly, 15*(2), 175-183.

Rouse, P. C., Ntoumanis, N., Duda, J. L., Jolly, K., & Williams, G. C. (2011). In the beginning: Role of autonomy support on the motivation, mental health and intentions of participants entering an exercise referral scheme. *Psychology & Health, 26*(6), 729-749.

Ruiter, R. A., Kessels, L. T., Peters, G. J., & Kok, G. (2014). Sixty years of fear appeal research: current state of the evidence. *International Journal of Psychology: Journal Intenational de Psychologie, 49*(2), 63-70.

Ryan, R. M. (1995). Psychological needs and the facilitation of intetragive processes. *Journal of Personality, 63*, 397-427.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57*, 749-761.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141-166.

Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3-33). Rochester: The University of Rochester Press.

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist, 10*, 2-5.

Ryan, R. M., Williams, G. C., Patrick, H., & Deci, E. L. (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology, 6*(2), 107-124.

Ryden, P. J., & Sydner, Y. M. (2011). Implementing and sustaining dietary change in the context of social relationships. *Scandinavian Journal of Caring Sciences, 25*(3), 583-590.

Sallis, J. F. (2010). Temporal self-regulation theory: A step forward in the evolution of health

behavior models. *Health Psychology Review, 4*, 75-78.

Salvy, S.-J., Kieffer, E., & Epstein, L. H. (2008). Effects of social context on overweight and normal-weight children's food selection. *Eating Behaviors, 9*(2), 190-196.

Sarvela, P. D., Huetteman, J. D., & Bajracharya, S. (1990). Needs assessment for a university wellness centre: A strategic planning project. *Health Values: Achieving High Level Wellness, 14*, 24-32.

Scholz, U., Nagy, G., Gohner, W., Luszczynska, A., & Kliegel, M. (2009). Changes in self-regulatory cognitions as predictors of changes in smoking and nutrition behaviour. *Psycholoy & Health, 24*(5), 545-561.

Seeley, E. A., & Gardner, W. L. (2006). Succeeding at Self-Control through a Focus on Others: The Roles of Social Practice and Accountability in Self-Regulation. *Vohs, Kathleen D [Ed]*, 407-425.

Seo, D. C., Torabi, M. R., Jiang, N., Fernandez-Rojas, X., & Park, B. H. (2009). Correlates of collage students' physical activity: Cross-cultural differences. *Asia-Pacific Journal of Public Health, 21*(4), 421-432.

Shabana, H. (2007). Protection motivation theory and its implication for exercise and better eating habits. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 68*(5-B), 3441.

Sheldon, K., Williams, G., & Joiner, T. (2003). *Self-determination in the clinic: Motivating physical and mental health*. New Haven, CT: Yale University Press.

Sheldon, K. M., & Schuler, J. (2015). Agency and its discontents: A two-process perspective on basic psychological needs and motives *APA handbook of personality and social psychology, Volume 4: Personality processes and individual differences* (pp. 167-187). Washington, DC: American Psychological Association; US.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*, 63-75.

Shmueli, D., & Prochaska, J. J. (2009). Resisting tempting foods and smoking behavior:

implications from a self-control theory perspective. *Health Psychology, 28*(3), 300-306.

Silva, M. N., Markland, D., Vieira, P. N., Coutinho, S. R., Carraca, E. V., Palmeira, A. L., et al. (2010). Helping overweight women become more active: Need support and motivational regulations for different forms of physical activity. *Psychology of Sport and Exercise, 11*(6), 591-601.

Simantov, E., Schoen, C., & Klein, J. D. (2000). Health-compromising behaviors: why do adolescents smoke or drink?: identifying underlying risk and protective factors. *Archives of Pediatrics & Adolescent Medicine, 154*(10), 1025-1033.

Skeer, M. R., & Ballard, E. L. (2013). Are family meals as good for youth as we think they are? A review of the literature on family meals as they pertain to adolescent risk prevention. *Journal of Youth and Adolescence, 42*(7), 943-963.

Smit, E. S., Fidler, J. A., & West, R. (2011). The role of desire, duty and intention in predicting attempts to quit smoking. *Addiction, 106*(4), 844-851.

Sniehotta, F. F. (2009). Towards a theory of intentional behaviour change: Plans, planning, and self-regulation. *British Journal of Health Psychology, 14*(2), 261-273.

Spencer, G. (2013). Young people's perspectives on health: Empowerment, or risk? *Health Education, 113*(2), 115-131.

Spring, B., Moller, A. C., & Coons, M. J. (2012). Multiple health behaviours: Overview and implications. *Journal of Public Health, 34*(Supplement -1), i3-i10.

Statistics Canada. (2009). Tobacco use statistics. Retrieved January, 10, 2009, from http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/index-eng.php

Statistics Canada. (2013a). Canada and Saskatchewan (table) *Health Profile. Statistics Canada Catalogue no. 82-228-XWE.Released December 12, 2013.* Retrieved July 6, 2015, from http://www12.statcan.gc.ca/health-sante/82-228/index.cfm?Lang=E

Statistics Canada. (2013b). Table 105-0501 - Health indicator profile, annual estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) and peer groups, occasional, CANSIM (database). Retrieved July 10, 2015, from

http://www5.statcan.gc.ca/cansim/a26?Lang=eng&retrLang=eng&id=1050501&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid=

Tamers, S. L. (2011). Understanding the relationship between worksite social support, obesity, health care utilization, and worker productivity. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 71*(12-B), 7391.

Teitelman, A. M., Stringer, M., Nguyen, G. T., Hanlon, A. L., Averbuch, T., & Stimpfel, A. W. (2011). Social Cognitive and Clinical Factors Associated with HPV Vaccine Initiation Among Urban, Economically Disadvantaged Women. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 40*(6), 691-701.

Teixeira, P. J., Carraca, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *The International Journal of Behavioral Nutrition and Physical Activity, 9*, 78.

Thiel, A., Diehl, K., Giel, K. E., Schnell, A., Schubring, A. M., Mayer, J., et al. (2011). The German Young Olympic Athletes' Lifestyle and Health Management Study (GOAL Study): design of a mixed-method study. *BMC Public Health, 11*, 410.

Thøgersen-Ntoumani, C., & Ntoumanis, N. (2006). The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *Journal of Sports Sciences, 24*(4), 393-404.

Tice, D. M., & Bratslavsky, E. (2000). Giving in to feel good: The place of emotion regulation in the context of general self-control. *Psychological Inquiry, 11*(3), 149-159.

Ting, S. A. (2011). Testing the MASS model: Motivation, affect, social support and self-efficacy as predictors of exercise behaviors. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 71*(7-B), 4542.

Trafimow, D., Sheeran, P., Lombardo, B., Finlay, K. A., Brown, J., & Armitage, C. J. (2004). Affective and cognitive control of persons and behaviors. *British Journal of Social Psychology, 43*, 207-224.

Tripathi, A., & Samantaray, S. K. (2011). Examining the relationship of need satisfaction and

self-determined motivation to well-being among exercisers. *Journal of Psychosocial Research, 6*(2), 195-202.

Tucker, P., & Irwin, J. D. (2011). University students' satisfaction with, interest in improving, and receptivity to attending programs aimed at health and well-being. *Health Promotion Practice, 12*(3), 388-395.

Tyrrell, R. L., Townshend, T. G., Adamson, A. J., & Lake, A. A. (2015). 'I'm not trusted in the kitchen': Food environments and food behaviours of young people attending school and college *Journal of Public Health, first published online March 11, 2015*

Ullrich-French, S., Cox, A. E., & Bumpus, M. F. (2013). Physical activity motivation and behavior across the transition to university. *Sport, Exercise, and Performance Psychology, 2*(2), 90-101.

Umstattd, M. R., Saunders, R., Wilcox, S., Valois, R. F., & Dowda, M. (2006). Correlates of self-regulation for physical activity among older adults. *Americal Journal of Health Behavior, 30*(6), 710-719.

US Department of Health and Human Services. (2000). *Healthy people 2010*. Washington, DC: US Department of Health and Human Services.

Vahasarja, K., Kasila, K., Kettunen, T., Rintala, P., Salmela, S., & Poskiparta, M. (2015). 'I saw what the future direction would be...': Experiences of diabetes risk and physical activity after diabetes screening. *British Journal of Health Psychology, 20*(1), 172-193.

Vallerand, R. J., Pelletier, L. G., & Koestner, R. (2008). Reflections on self-determination theory. *Canadian Psychology/Psychologie canadienne, 49*(3), 257-262.

Vallerand, R. J., & Rattelle, C. (2002). Intrinsic and extrinsic motivation: A hierarchical model. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3-33). Rochester, NY: University of Rochester Press.

Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: An historical overview, emerging trends, and future directions. In T. C. Urdan & S. A. Karabenick (Eds.), *Advances in motivation and*

achievement (Vol. 16A, pp. 105-165). London: Emerald Group Publishing Limited.

Wass, A. (2000). *Promoting health: The primary health care approach* (2nd ed.). Sydney, Australia: Harcourt Saunders.

Wells, K. (2013). Gender, race, year in school and five co-occurring health related behaviors of Colorado state university students. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 74*(6-A(E)), No Pagination Specified.

Westmaas, J. L., Bontemps-Jones, J., & Bauer, J. E. (2010). Social support in smoking cessation: reconciling theory and evidence. *Nicotine & Tobacco Research, 12*(7), 695-707.

Williams, G. C. (2002). Improving patients' health through supporting the autonomy of patients and providers. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 233-253). Rochester, NY: University of Rochester Press.

Williams, G. C., Minicucci, D. S., Kouides, R. W., Levesque, C. S., Chirkov, V. I., Ryan, R. M., et al. (2002). Self-determination, smoking, diet and health. *Health Education Research, 17*(5), 512-521.

Wills, T. A., Walker, C., Mendoza, D., & Ainette, M. G. (2006). Behavioral and emotional self-control: Relations to substance use in samples of middle and high school students. *Psychology of Addictive Behaviors, 20*(3), 265-278.

Wilson, E. O. (1998). *Consilience: The unity of knowledge*. New York: Vintage.

Wisdom, J. P., Cavaleri, M. A., Onwuegbuzie, A. J., & Green, C. A. (2012). Methodological reporting in qualitative, quantitative, and mixed methods health services research articles. [Research Support, N.I.H., Extramural]. *Health Services Research, 47*(2), 721-745.

Wong, M. M., & Rowland, S. E. (2013). Self-determination and substance use: Is effortful control a mediator? *Alcoholism: Clinical and Experimental Research, 37*(6), 1040-1047.

World Health Organization. (2009). Chronic disease risk factors. Retrieved May, 20, 2009, from http://www.who.int/dietphysicalactivity/publications/facts/riskfactors/en/

Xu, X. (2010). Health motivation in health behavior: Its theory and application. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 70*(9-B), 5876.

APPENDIX A
DEFINITIONS OF HEALTH CONCEPTS

Concept	Definition
Health	is not equated with the absence of disease, but is seen as a harmonious combination of physical, mental, emotional, and social well-being (Low & Thériault, 2000; Wass, 2000)
Physical health	a harmonious functioning of all physiological systems
Psychological well-being	a combination of positive mental and emotional conditions that accompany a person's life
Multiple health behaviour cluster	A combination of all health behaviours (health-risk and/or health-maintenance) that simultaneously coexist, or co-occur, within an individual
Health-risk behaviours	the practices that undermine people's physical health and psychological well-being or otherwise predispose individuals to disease
Health-maintenance behaviours	convey health benefits or otherwise protect individuals from disease
Smoking	Smoking of tobacco products, such as cigars and cigarettes (Statistics Canada, 2009)
occasional smokers	the frequency of smoking ranges from low (1-10 days a month) to moderate (11-20 days a month)
daily smokers	the frequency of smoking is 21-30 days a month
light smokers	the intensity of smoking is 1-10 cigarettes a day
moderate smokers	the intensity of smoking is 11-19 cigarettes a day
heavy smokers	the intensity of smoking is 20 and more cigarettes a day
Alcohol drinking	drinking alcoholic beverages, including beer (Canadian Centre on Substance Abuse, 2013)
low-risk drinkers	drinking ranges from low (1-10 days a month) to moderate (11-20 days a month)
high-risk drinkers	drink 21-30 days a month
social drinkers	the intensity of drinking is 1-4 drinks on a single occasion
binge/heavy/excessive drinkers	the intensity of drinking is more than 5 drinks on a single occasion
Physical activity	
low	the frequency of engagement is 1-10 days a month
moderate	the frequency of engagement is 11-20 days a month
high	the frequency of engagement is 21-30 days a month
Healthy eating	when meals (at least one a day) include such healthy foods as fruit and vegetables, low processed food, low in fat, or organic food, and such unhealthy foods as fast food, sugar drinks, highly processed food or fatty food are avoided
low	frequency of engagement is 1-10 days a month
moderate	frequency of engagement is 11-20 days a month
high	frequency of engagement is 21-30 days a month

Health behaviour regulation	an outcome of competing influences (external and internal) that contribute to the individual's health behaviour motivation but are balanced and decided upon by the individual (Sniehotta, 2009).
(Individual) health behaviour motivation	a combination of individual's motivational regulations (or motivations) which differ in the type of internalization that has taken place (Ryan & Deci, 2002)[8]
controlled motivational regulation (or motivation)	a combination of external and introjected forms of motivational regulations; it is an instance of an individual's regulation not being fully accepted as one's own and working in its original external form, that is, to obtain rewards or avoid punishments, guilt, anxiety, or shame
autonomous motivational regulation (or motivation)	a combination of identified and integrated forms of motivational regulation; it involves an acceptance of the behaviour as personally important and the outcome of the activity is congruent with an individual's core values and needs
intrinsic motivational regulation (or motivation)	is a case of full internalization, when a individual develops an interest for doing the activity itself and consequently finds it enjoyable and its results satisfying
Motivational profile	a combination of weights the participants assign to the different types of motivations for a particular health behaviour, such as a combination of mean scores on the motivational scale
(Individual) Self-regulation	individuals' capacity to make and maintain changes to their behavior in the absence of external prompting, incentive, or reinforcement
Health attitudes	cognitive evaluations of health importance and an individual's responsibility for health
Psychological health empowerment(or health empowerment)	a cognitive state characterized by perceptions of one's own agency, control regarding one's own health, and competence regarding one's ability to maintain good health (Nocon, et al., 2007)
Social context[9]	a dynamic force, which affects individuals embedded within a given social structure by supporting or thwarting their basic psychological needs (Chirkov, et al., 2011). Social context includes family members, friends and other people that are related/influence or participate in health behaviours of the participants.

[8] Prior literature suggests that amotivation is a vague construct: it can mean a lack of motivation associated with feelings of incompetence and lack of control (Deci & Ryan, 1985; Pelletier, et al., 2004), or a negative driving force that should be distinguished from a lack of positive drive in the form of controlled, autonomous or intrinsic regulation (Ingledew & Markland, 2008; Teixeira, et al., 2012). That is why it was not considered among the components of motivational regulation in this study.

[9] As a descriptive concept, social context is too complex and ambiguous to be applied in social psychological research directly (Morgan & Swann, 2004).

APPENDIX B
SURVEY QUESTIONNAIRE

Social Context, Autonomy and Health Behavior of Young Canadians

Part I

Please answer each item in this survey. Remember that there are no "right" or "wrong" answers to any question here. We are interested in your personal opinion, feelings and impressions, please do not put down the answers you think are "socially correct" -- answer according to how you feel.

As part of this research study, it is important that all the survey questions are completed. It is however, your right, not to answer any question that you do not wish to answer.

There are many questions, and this survey takes about 45-60 min to complete. We know that answering so many items takes some patience, so we appreciate your coming and contribution to this research project.

BEFORE YOU START:

1. **Please leave your contact information here:**

To supplement the survey results we will be conducting one-on-one interviews (in February-March, 2009). About 10-12 participants will be contacted. The interview will consist of 10-15 questions pertaining to more specific areas of your health experience. It will take about 45 minutes of your time. You will decide when and where to have an interview. The interview will be audio taped and its transcript will be given to you for your final review and approval. The credits for the interview will be added to the credits received for the survey. You may be asked for a second round of interview. In this case you will get a small financial compensation (about $15.00) for the second interview.

If you wish to participate in the interview follow up phase, please leave your contact information. Leaving your contact information is not a commitment to participate later – you may withdraw from the study at any time without a penalty of any sort:

Your Participant Pool ID Number (SONA number): _____
Your Email (optional)**:**_____

Your contact information will be treated confidentially: it will be linked with your arbitrary personal ID number only, it will be stored separately from your data and consent form, and only the researchers will have access to it. It will be stored securely at the supervisor's office and will be destroyed after data collection for this study (March-April, 2009).

2. Please use the arbitrary Personal ID number given below when answering the survey.

Your Personal ID Number for this study is

_____

Part II

Please answer the following questions using the provided scales.

1. How important is it to you to be healthy?

not important at all						very important
1	2	3	4	5	6	7

2. How much do you think people's health depends on their behaviour?

does not depend at all						depends entirely
1	2	3	4	5	6	7

3. How much do you think people are responsible for their health?

not responsible						responsible
1	2	3	4	5	6	7

4. How typical is it for people around you (on campus, in your community, etc.) to live a healthy lifestyle (be physically active, to eat healthy, not to abuse alcohol, not to smoke etc.)?

very unusual						very typical
1	2	3	4	5	6	7

5. How would you describe your present state of health these days? Would you say it is….

very poor	poor	rather poor than good	fair	rather good than poor	good	very good
1	2	3	4	5	6	7

Please express your agreement or disagreement with the following health-related statements:

strongly disagree 1	disagree 2	somewhat disagree 3	uncertain 4	somewhat agree 5	agree 6	strongly agree 7

6. According to the doctors I've seen, my health is now excellent.
7. I never worry about my health.
8. I've never had an illness that lasted a long period of time (3 months or longer).
9. I expect to have a very healthy life.
10. I feel about as good now as I ever have.

During the past 30 days, on how many days did you experience each of these symptoms?

0 days 1	1 or 2 days 2	3 to 5 days 3	6-9 days 4	10-15 days 5	16-20 days 6	21-30 days 7

11. headaches
12. coughing/sore throat
13. shortness of breath
14. stomach ache/pain
15. runny/congested nose
16. stiff/sore muscles
17. chest/heart pain
18. faintness/dizziness
19. disturbances with sleep
20. disturbances with appetite

Please rate each of the following statements using the following scale:

strongly disagree 1	disagree 2	somewhat disagree 3	uncertain 4	somewhat agree 5	agree 6	strongly agree 7

21. I judge myself by what I think is important, not by what others think is important.
22. I am quite good at mastering the many responsibilities of my daily life.
23. I have given up trying to make big improvements or changes in my life.
24. I have not experienced many warm and trusting relationships with others.

25. I sometimes feel that I've done all there is to do in life.
26. In many ways, I feel disappointed about my achievements in life.
27. I have confidence in my own opinions, even if they are contrary to the general consensus.
28. The demands of everyday life often get me down.
29. For me, life has been a continuous process of learning, changing, and growth.
30. People would describe me as a giving person, willing to share my time with others.
31. Some people wander aimlessly through life, but I am not one of them.
32. I like most aspects of my personality.
33. I tend to be influenced by people with strong opinions.
34. In general, I feel I am in charge of the situation in which I live.
35. I think it is important to have new experiences that challenge how you think about yourself and your world.
36. Maintaining close relationships has been difficult and frustrating for me.
37. I live life one day at a time and don't really think about the future.
38. When I look at the story of my life, I am pleased with how things have turned out.

39. **Some people feel they have free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them.** Please indicate how much freedom of choice you feel you have over the way your life turns out.

none at all						**a great deal**
1	**2**	**3**	**4**	**5**	**6**	**7**

Please rate each of the following statements using the following scale:

strongly disagree	**disagree**	**somewhat disagree**	**uncertain**	**somewhat agree**	**agree**	**strongly agree**
1	**2**	**3**	**4**	**5**	**6**	**7**

40. I have the time and finances to choose a healthy lifestyle and healthy conditions.
41. I have the resources to maintain good health.
42. I know I have access to health care when I need it.
43. I know I can get good healthy care if I need it.
44. I know I can influence my doctor's and other health services providers' decisions regarding my health and health care.

45. I know I have the power to make decisions concerning my health.

Please express your agreement or disagreement with the following health-related statements:

strongly disagree 1	disagree 2	somewhat disagree 3	uncertain 4	somewhat agree 5	agree 6	strongly agree 7

46. I have the capability and knowledge required to maintain a healthy lifestyle.
47. I believe I can lead a healthy lifestyle.
48. I believe I'm able to make the right decisions to maintain good health.
49. I believe I have the competence to be healthy.
50. I have the ability to manage minor ailments that do not require specialized medical assistance.
51. I believe I have the competence to know when to see a doctor.
52. I know how to seek specialized medical assistance when needed.

Below are two lists of health-related behaviours that people often perform. We will ask you two questions about the frequency of each behaviour. Please answer these questions and then follow the instructions. Now, let's start with the list #1.

Health-Related Behaviours: List 1

 # smoking

53. **During the past 30 days, on how many days did you smoke cigarettes?**
    1. 0 days (go to the question 78)
    2. 1-5 days
    3. 6-10 days
    4. 11-15 days
    5. 16-20 days
    6. 21-25 days
    7. 26-30 days
54. **How many cigarettes a day have you been smoking for the last 30 days?**
    1. I have not smoked at all
    2. 1-5 cigarettes per day

3. 6-10 cigarettes per day
4. 11-15 cigarettes per day
5. 16 to 20 cigarettes per day
6. 21 to 25 cigarettes per day
7. More than 25 cigarettes per day

 # *alcohol drinking*

55. **During the past 30 days, on how many days did you have at least one drink of alcohol (beer including)?**
    1. 0 days (go to the question 80).
    2. 1-5 days
    3. 6-10 days
    4. 11-15 days
    5. 16-20 days
    6. 21-25 days
    7. 26-30 days
56. **During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?**
    1. 0 days
    2. 1 day
    3. 2 days
    4. 3 to 5 days
    5. 6 to 9 days
    6. 10 to 19 days
    7. 20 or more days

Health Related Behaviour: List 2

 # *physical activity*

57. **On how many of the past 30 days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?**
    1. 0 days
    2. 1-5 days
    3. 6-10 days
    4. 11-15 days
    5. 16-20 days
    6. 21-25 days
    7. 26-30 days
58. **On how many of the past 30 days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?**
    1. 0 days
    2. 1-5 days
    3. 6-10 days
    4. 11-15 days
    5. 16-20 days
    6. 21-25 days
    7. 26-30 days

healthy eating

59. **On how many days during the past 30 days did you have at least one meal (breakfast, lunch, and dinner/supper) that included healthy food: fruit and vegetables, low processed or raw food, low in fat, organic food?**
    1. 0 days
    2. 1-5 days
    3. 6-10 days
    4. 11-15 days
    5. 16-20 days
    6. 21-25 days
    7. 26-30 days

60. **On how many days during the past 30 days did you have at least one meal (breakfast, lunch, and dinner/supper) that included unhealthy food: fast food, sugar drinks, highly processed food or fatty food?**
    1. 0 days
    2. 1-5 days
    3. 6-10 days
    4. 11-15 days
    5. 16-20 days
    6. 21-25 days
    7. 26-30 days

In this task, we will ask you the question: Why do you do certain health related behaviours?
People may be motivated to do something for many different reasons. Below there are 5 possible reasons that can be applied to these behaviours. Some of these reasons are less, while the others are more applicable to your typical motivation for each of these behaviours. That is why we ask you to rate these behaviours in terms of <u>each</u> of the following five reasons.

To help you to answer this question, we provide you with an example which is used as a training exercise. The example behaviour **is to dress neatly**. Why do you do this? (Please don't write on the answer sheet).

Reason 1. Because of External Pressures (To Get Rewards or Avoid Punishments).
I am engaged in this behaviour because someone insists on my doing this or I expect to get some kind of reward, or avoid some punishment for behaving this way.
According to this reason you dress neatly because your parents, teachers, boss, or spouse make you do so. They reward such behaviour, or insist on it. Without these external pressures you wouldn't dress neatly.
Assess to what extent you dress neatly because of this reason.
Use the following scale:

Not at all because of this reason 1	A little because of this reason 2	Somewhat because of this reason 3	Mostly because of this reason 4	Completely because of this reason 5

If this were an actual question you would then mark this number on the answer sheet.

Reason 2. To Get Approval or Avoid Guilt.

I am engaged in this behaviour because people around me approve of me for doing so, and I think I should do it. If I wouldn't, I might feel guilty, ashamed, or anxious.

With this reason you dress neatly to get the approval of people around you. If you would dress slovenly you would be ashamed. In comparison to the previous reason, you do not necessary have a direct outside pressure.

You would assess to what extent you typically dress neatly because of this reason by applying the same scale, and marking the appropriate number on the answer sheet.

Reason 3. Because It is Important.

I am engaged in this behaviour because I personally believe that it is important and worthwhile to behave this way.

With this reason, you dress neatly because you personally believe that it is important for you to look neat. You consider that this is the right way for you to be dressed.

You would assess the correspondence of this reason to your typical motivation to dress neatly by applying the same scale, and marking the appropriate number on the answer sheet.

Reason 4. Because it is thoughtfully considered and fully chosen.

I have thought about this behaviour and fully considered alternatives. It makes good sense to me to act this way. I feel free in choosing and doing it, and feel responsible for the outcomes.

According to this reason every time you dress neatly, you realize why you are doing it at that time. You also understand that in other situations you might dress less neatly, but in each case you would admit the consequences of your choice and you would readily accept responsibility for your behaviour.

You would assess the correspondence of this reason to your typical motivation to dress neatly by applying the same scale, and marking the appropriate number on the answer sheet.

Reason 5. Because it is fun and real pleasure to do.

I am engaged in this behaviour because it is fun and real pleasure to do.

According to this reason, it is a real pleasure for you to dress neatly. You fully enjoy being dressed neatly and find it fun and satisfying to do this.

You would assess the correspondence of this reason to your typical motivation to dress neatly by applying the same scale, and marking the appropriate number on the answer sheet.

Now, please answer the questions about your health behaviours <u>on the answer sheet</u>, using the following scale:

Not at all because of this reason	A little because of this reason	Somewhat because of this reason	Mostly because of this reason	Completely because of this reason
1	2	3	4	5

Please remember that in answering the following questions we would like you to rate the typical motivation for this behaviour in terms of <u>each of the five reasons</u> previously explained.

Behaviour #1 - smoking

If you are not engaged in this behaviour please mark **0** for questions 79-83.

61. **Reason 1.** Because of External Pressures
62. **Reason 2.** Get Approval or Avoid Guilt
63. **Reason 3.** Because it is Important
64. **Reason 4.** Because it is Thoughtfully Considered and Fully Chosen
65. **Reason 5.** Because it is fun and real pleasure to do

Behaviour #2 – alcohol drinking

If you are not engaged in this behaviour please mark **0** for questions 84-88.

66. **Reason 1.** Because of External Pressures
67. **Reason 2**. Get Approval or Avoid Guilt
68. **Reason 3**. Because it is Important
69. **Reason 4.** Because it is Thoughtfully Considered and Fully Chosen
70. **Reason 5.** Because it is fun and real pleasure to do

Behaviour #3 – physical activity

If you are not engaged in this behaviour please mark **0** for questions 89-93.

71. **Reason 1.** Because of External Pressures

72. **Reason 2.** Get Approval or Avoid Guilt

73. **Reason 3.** Because it is Important

74. **Reason 4.** Because it is Thoughtfully Considered and Fully Chosen

75. **Reason 5.** Because it is fun and real pleasure to do

Behaviour #4 – healthy eating.

If you are not engaged in this behaviour please mark **0** for questions 94-98.

76. **Reason 1.** Because of External Pressures

77. **Reason 2.** Get Approval or Avoid Guilt

78. **Reason 3**. Because it is Important

79. **Reason 4.** Because it is Thoughtfully Considered and Fully Chosen

80. **Reason 5.** Because it is fun and real pleasure to do

Please answer the following questions about your parents sincerely and openly. We are interested in your personal opinion. Please remember, that all your answers will be kept confidential.

strongly disagree 1	disagree 2	somewhat disagree 3	uncertain 4	somewhat agree 5	agree 6	strongly agree 7

81. My parents, whenever possible, allow me to choose what to do.

82. My parents convey confidence in my abilities.

83. I feel understood by my parents.

84. My parents insist upon my doing things their way.

85. My parents make me feel competent in my work.

86. My parents aren't very sensitive to my needs and feelings.

87. My parents try to tell me how to live my life.

88. My parents constantly blame me for my mistakes.

89. My parents put time and energy into helping me.

90. I can be myself with my parents/teachers/friends.

91. My parents answer my questions fully and carefully.

92. My parents care about me.

93. My parents allow me to decide things for myself.

94. My parents never listen to how I would like to improve things.

95. My parents are not very involved with my concerns.

Now please answer the questions about your friends using the same scale:

strongly disagree	disagree	somewhat disagree	uncertain	somewhat agree	agree	strongly agree
1	2	3	4	5	6	7

96. My friends, whenever possible, allow me to choose what to do.

97. My friends convey confidence in my abilities.

98. I feel understood by my friends

99. My friends insist upon my doing things their way.

100. My friends make me feel competent in my work.

101. My friends aren't very sensitive to my needs and feelings.

102. My friends try to tell me how to live my life.

103. My friends constantly blame me for my mistakes.

104. My friends put time and energy into helping me.

105. I can be myself with my friends.

106. My friends answer my questions fully and carefully.

107. My friends care about me.

108. My friends allow me to decide things for myself.

Now, please tell us about yourself:

109-110. **What is your age? (**Fill in your **AGE** in rows **2** and **3** (For example: for **22** years mark "**2**" in the row **2** and "**2**" in the row **3**).

111. **What is your sex? ('1'** for male and **'2'** for female)

112. **How do you identify yourself ethnically?**

1. Euro-Canadian (English speaking)
2. Euro-Canadian (French speaking)

3. Aboriginal/Métis
4. Asian-Canadian
5. Other

113. **What is your family's current income per year?**

1. less than $10,000
2. $10,000 - $25,000
3. $25,001 - $40,000
4. $40,001 - $70,000
5. $70,001 - $100,000
6. more than $100,000

APPENDIX C
CONSENT FORM

Social Context, Autonomy and Health Behavior of

You are invited to participate in a research study entitled "***Social Context, Autonomy and Health Behavior of Young Canadians".*** Please read this form carefully, and feel free to ask any questions you might have about the study.

Principal Researcher:

Dr. Valery Chirkov**,** Department of Psychology, 966-6529; v.chirkov@usask.ca

Student Researchers:

Inna Molodtsova, Department of Psychology, inm989@mail.usask.ca

Lauren Penner, Department of Psychology, ibp016@mail.usask.ca

Purpose and Procedure: The purpose of the study is to investigate the students' attitudes toward their health and to discover the social and personality factors related to their health behaviours. First, you will be given a set of psychological questionnaires with detailed instructions, which will ask you about your health habits, attitudes toward your health, perception of your social environment and some personality and demographic characteristics. It will take about 45-60 min to answer all the questions. Later, if you choose to and leave your contact information (SONA number and/or email), you may be contacted (in December 2008 -February 2009) and invited for an interview. The interview will consist of 10-15 questions pertaining to more specific areas of your health experience. It will take about 45 minutes of your time. You will decide when and where to have an interview. It will be one-on-one interview and will be audio taped; the interview transcript will be given back to you for your final review and approval. You may be asked for a second round of interview. In this case you will get a small financial compensation (about $15.00) for the second interview.

Potential Benefits: This study provides you with an opportunity to learn how social psychologists study people's health behaviour and health attitudes. The data collected in this study will let the researcher to investigate further how social context relate to people's health attitudes and health related behaviours.

Risks: There are no known risks associated with participation in this study. Furthermore, you may receive no personal benefit from participation in the study. At the end of the study you will be given a debriefing form that better explains the nature of the study and you will be given a chance to ask any further questions that you might have.

Confidentiality: Your data will be kept completely confidential and no personally identifying information will be linked to your data. Any potentially identifying information will be modified or removed. The data will be transcribed and coded using the arbitrary Personal ID numbers. Your contact information (SONA number and/or email) will be linked with arbitrary Personal IDs only and will be destroyed right after data collection for this study. The data and the consent forms will be stored securely at the University of Saskatchewan by the principal investigator for a minimum of five years after completion of the study and if no longer required after this time, they will be destroyed beyond recovery. Moreover, the consent forms will be stored separately from the questionnaires, your contact information, audio tapes and transcripts, so that it will not be possible to associate a name with any data. Only the

principal investigator and the researcher assistants will have access to the data, contact information and reports. The results of this study may be published and presented at conferences but the data will be reported in aggregate form so that it will not be possible to identify individuals.

Right to withdraw: Your participation is entirely voluntary. You may withdraw from the study for any reason, at any time, and without loss of research credit for the session. If you withdraw prior to half an hour into the study you will receive one credit. If you withdraw after thirty minutes you will receive two credits. One credit is assigned for every half an hour or portion thereof. If you withdraw from the study, any information you have already provided will be deleted from our database. If you feel uncomfortable with any of the questions in the survey, you may skip them. If you are contacted for the interview, you will be assigned credits for the interview likewise. One credit is assigned for every half an hour or portion thereof. If you withdraw prior to half an hour into the interview you will receive one credit. If you withdraw after thirty minutes you will receive two credits. If you withdraw from the interview, any information you have already provided will be deleted from our database. You may also refuse to answer any interview questions you feel uncomfortable with.

Questions: If you have any questions concerning the study, please feel free to ask at any point. You are also free to contact the researchers at the numbers provided above if you have questions at a later time. The proposed research was reviewed and approved on ethical grounds by the University of Saskatchewan Behavioral Research Ethics Board on Nov, 24, 2008. Any questions regarding your rights as a participant may be addressed to the Behavioural Research Ethics Board through the Ethics Office (966-2084). Out of town participants may call collect. You may obtain a copy of the results of the study by contacting the student-researcher or the supervisor.

Consent to Participate: *I have read and understand the description of the research study provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I agree to participate in the study described above, understanding that I may withdraw my consent to participate at any time. A copy of this consent form has been given to me for my records.*

_____ _____

(Signature of Participant) (Date)

_____

(Signature of Researcher)

APPENDIX D
DEBRIEFING FORM

Social Context, Autonomy and Health Behavior of

Names of Researchers:

Principal Researcher: Dr. Valery Chirkov**,** Department of Psychology.

Student Researchers: Inna Molodtsova, Department of Psychology

Lauren Penner, Department of Psychology

Thank you for participating in this study. Your involvement is much appreciated and has allowed contribution towards the psychological research of personal experience, health and well-being.

This study is a part of a bigger project in which we examine the associations of the different cultural practices, such as individualism (when people see a person as the main unit of social life) and collectivism (when people see a group as the unit of social life), equality and dominance, with people's motivation to live healthy life. We believe that some cultural practices better promote the environment that supports people's autonomous and self-determined behaviour than the others. For example, the practices built on the values of trust, respect and tolerance (we call them horizontal) should be more conductive toward healthy behaviour than the practices that support obedience, competition and loyalty (which we call vertical). In this study, we are testing a hypothesis related to this assumption. We believe that horizontal practices are more conducive toward self-determined health behaviour motivation than the vertical ones, and we also think that horizontal practices promote orientation toward future which motivates people to take care of their health. This type of research is very relevant for developing new social policies regarding health promotion.

If you want to learn more about this study or want to find out about its results please feel free to contact either of the researchers listed below:

Prinicipal Researcher: Dr. Valery Chirkov**,** Department of Psychology, 966-6529; v.chirkov@usask.ca

Student-Researchers: Inna Molodtsova, Department of Psychology, inm989@mail.usask.ca

Lauren Penner, Department of Psychology, lbp016@mail.usak.ca

If you wish, you may withdraw your data from the study at this point.

If for any reason you feel worried, upset or stressed after participating in this survey you are encouraged to contact: Student Counselling Services (966-4920) or Student Health Centre (966-5768).

With any other concerns about this study you may contact the Research Ethics Office (306 966-2084)

It is important in social psychological researches that participants do not know about specific theoretical predictions before entering a study. Such knowledge may directly influence behaviour and may invalidate a study. For this reason, please do not provide the information in this Debriefing Form to anyone who is planning to participate in this study.

Thank you for your cooperation.

APPENDIX E
LETTER OF INVITATION TO A FOLLOW-UP INTERVIEW

Thank you for your participation in our survey 'Social Context, Autonomy and Health Behaviour of Young Canadians'.

You are invited to take part in an interview follow-up. It will be one-on-one interview and will last for about 45 min.

Since it's a busy time of the year, we've reconsidered our interview schedule. The interviews can be conducted at any time convenient for you in April-May. Each participant will receive $15 cash as a sign of our appreciation.

In case you need credits (2 credits), the interviews need be conducted till the participants' pool closes (on April 17th, 5:00 p.m.).

VERY FEW PEOPLE HAVE BEEN SELECTED, SO YOUR PARTICIPATION IS MUCH, MUCH APPRECIATED!!!

Please let us know if you can take part in it or not, and what day and time would work best for you!

APPENDIX F

SEMI-STRUCTURED INTERVIEW PROTOCOL

***Study*:** Health Attitudes and Motivation for Health Related Behaviours of Canadian University Students

Interviewee ID:_____ **Interviewer:** _____

Date: _____ **Place:** _____

Time started: _____ **Time finished:** _____

Survey scores:

Frequency of health behaviours: smoking_____drinking_____

physical activity_____healthy eating_____

Important health-maintenance practices: _____

Health Motivation: smoking_____

drinking_____

physical activity_____

healthy eating_____

Health Attitudes: importance of health_____

health depend on people's behaviour _____

people are responsible for their health _____

typicality of healthy lifestyle_____

Health Empowerment: agency_____

Perceived control_____

Perceived confidence_____

Health Outcomes: physical health_____

PWB_____

Social Context: parents_____

friends_____

Introduction:

The interview will consist of 10-15 questions asking you to expand or explain your answers to the questionnaire and tell about your relevant health experience. It will take about 45 minutes of your time. The interview will be audio taped, then the interview transcript will be given back to you for your final review and approval.

In the questionnaire we asked about the importance of health (probe: Is it important to you? Why?), and some common health-maintenance practices (the participants are asked to comment on their choices).

Questions	Comments
1. Any other practices which are important to you? 2. We also asked about the frequency of smoking, alcohol drinking, healthy eating and engagement in physical activity?	
3. And the reasons why you do it.. Could you please explain your choices to help me see bigger picture? 4. What are your reasons for smoking/alcohol drinking/being physically active/healthy eating? *Probes (*for each behaviour): Why is it important? Why is this reason relevant here? Why? Is this reason related to any of your reasons for engagement in other health behaviours? Of these 5 reasons, which would you say is the leading one for you? Has this always been the reason for doing so? 5. What do you enjoy about it? What's the not-so-good side? 6. How do you feel when you do this (each previously mentioned behaviour)? *Probes:* Before and after? Does it make you feel positive/negative about yourself? Do you experience any internal conflict? Do you experience any feeling of guilt/enjoyment? Why do you feel this particular feeling/emotion/mood? How does it relate to your feeling of self-control/ energy/ sense of achievement? How do you feel when you do the opposite, or skip it?	
7. Does your behaviour/patterns of behaviour/reasons change depending on a. the people you're with b. situation you're in c. your inner state Could you please give an example? *Probes:* Which of these do you think have potential to bring about the change?	
8. Are you satisfied with your lifestyle and health routine? *Probes:* Would you like to change anything? Why? If so - do you think you could easily do it? Why do you think so?	

APPENDIX G
CONSENT FORM

Social Context, Autonomy and Health Behavior of Young

You are invited to participate in a research study entitled "***Social Context, Autonomy and Health Behavior of Young Canadians"***. Please read this form carefully, and feel free to ask any questions you might have about the study.

Student-Researcher:

Inna Molodtsova, Department of Psychology, inm989@mail.usask.ca

Lauren Penner, Department of Psychology, lbp016@mail.usask.ca

Supervisor:

Dr. Valery Chirkov, Department of Psychology, 966-6529; v.chirkov@usask.ca

Purpose and Procedure: The purpose of the study is to investigate the students' attitudes toward their health and to discover the social and personality factors related to their health behaviours. The interview will consist of 10-15 questions pertaining to more specific areas of your health experience. It will take about 45 minutes of your time. You will decide when and where to have an interview. It will be one-on-one interview and will be audio taped; the interview transcript will be given back to you for your final review and approval. You may be asked for a second round of interview. In this case you will get a small financial compensation (about $15.00) for the second interview.

Potential Benefits: This study provides you with an opportunity to learn how social psychologists study people's health behaviour and health attitudes. The data collected in this study will let the researcher to investigate further how social context relate to people's health attitudes and health related behaviours.

Risks: There are no known risks associated with participation in this study. Furthermore, you may receive no personal benefit from participation in the study. At the end of the study you will be given a debriefing form that better explains the nature of the study and you will be given a chance to ask any further questions that you might have.

Confidentiality: Your data will be kept completely confidential and no personally identifying information will be linked to your data. Any potentially identifying information will be modified or removed. The data will be transcribed and coded using the arbitrary Personal ID numbers. Your contact information (SONA number and/or email) will be linked with arbitrary Personal IDs only and will be destroyed right after data collection for this study. The data and the consent forms will be stored securely at the University of Saskatchewan by the principal investigator for a minimum of five years after completion of the study and if no longer required after this time, they will be destroyed beyond recovery. Moreover, the consent forms will be stored separately from the questionnaires, your contact information,

audio tapes and transcripts, so that it will not be possible to associate a name with any data. Only the principal investigator and the researcher assistants will have access to the data, contact information and reports. The results of this study may be published and presented at conferences but the data will be reported in aggregate form so that it will not be possible to identify individuals.

Right to withdraw: Your participation is entirely voluntary. You may withdraw from the study for any reason, at any time, and without loss of research credit for the session. If you withdraw prior to half an hour into the study you will receive one credit. If you withdraw after thirty minutes you will receive two credits. One credit is assigned for every half an hour or portion thereof. If you withdraw from the study, any information you have already provided will be deleted from our database. If you feel uncomfortable with any of the questions in the survey, you may skip them. If you are contacted for the interview, you will be assigned credits for the interview likewise. One credit is assigned for every half an hour or portion thereof. If you withdraw prior to half an hour into the interview you will receive one credit. If you withdraw after thirty minutes you will receive two credits. If you withdraw from the interview, any information you have already provided will be deleted from our database. You may also refuse to answer any interview questions you feel uncomfortable with.

Questions: If you have any questions concerning the study, please feel free to ask at any point. You are also free to contact the researchers at the numbers provided above if you have questions at a later time. The proposed research was reviewed and approved on ethical grounds by the University of Saskatchewan Behavioral Research Ethics Board on Nov, 24, 2008. Any questions regarding your rights as a participant may be addressed to the Behavioural Research Ethics Board through the Ethics Office (966-2084). Out of town participants may call collect. You may obtain a copy of the results of the study by contacting the student-researcher or the supervisor.

Consent to Participate: *I have read and understand the description of the research study provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I agree to participate in the study described above, understanding that I may withdraw my consent to participate at any time. A copy of this consent form has been given to me for my records.*

_____ _____

(Signature of Participant) (Date)

_____

(Signature of Researcher)

APPENDIX H
DEBRIEFING FORM

Social Context, Autonomy and Health Behavior of

Names of Researchers:

Student-Researchers: Inna Molodtsova, Department of Psychology

Lauren Penner, Department of Psychology

Supervisor: Dr. Valery Chirkov**,** Department of Psychology.

Thank you for participating in this study. Your involvement is much appreciated and has allowed contribution towards the psychological research of personal experience, health and well-being.

While in the first part of the study (survey) we were interested in investigating the health attitudes, motivation and behaviours at the between-person level, the primary purpose of the interview was to look at the same phenomena at the within-person level and get at the individual's health experience set in specific socio-cultural context and time perspective. We think that conducting these interviews is a good opportunity for our exploratory study to discover more information about the dynamics of motivation and the nature of relations between motivation, social capital and health outcomes. We believe that the discovery of these relations will allow us to answer the question what qualities of social and cultural environments facilitate healthy lifestyle and which don't.

As the next step we will be doing this study cross-culturally as we want to see the role different cultural settings play in determining health behaviour. Our colleagues will conduct it in Russia.

This type of research is very relevant for developing new social policies regarding health promotion.

If you want to learn more about this study or want to find out about its results please feel free to contact either of the researchers listed below:

Student-Researchers: Inna Molodtsova, Department of Psychology, inm989@mail.usask.ca

Lauren Penner, Department of Psychology, lbp016@mail.usak.ca

Supervisor: Dr. Valery Chirkov**,** Department of Psychology, 966-6529; v.chirkov@usask.ca

If for any reason you feel worried, upset or stressed after having this interview you are strongly encouraged to contact

Student Counselling Services (966-4920) or Student Health Centre (966-5768).

With any other concerns about this study you may contact the **Research Ethics Office (306 966-2084)**

It is important in social psychological researches that participants do not know about specific theoretical predictions before entering a study. Such knowledge may directly influence behaviour and may invalidate a study. For this reason, please do not provide the information in this Debriefing Form to anyone who is planning to participate in this study.

Thank you for your cooperation.

APPENDIX I
TRANSCRIPT CODES
Level 1

Dem	Demographic information

Health Behaviours:

HB	Health behaviours
HE	Healthy eating
PhA	Physical activity
Sm	Smoking
Al	Alcohol drinking
Fr	Health behaviour frequency

Health Motivation:

CM	Controlled motivation
AM	Autonomous motivation
IM	Intrinsic motivation
Ld	Leading component in the hierarchy of motivational regulation

Health Cognitions:

HAT	Health attitudes
HP	Health perceptions
PHE	Psychological health empowerment
SC	Self-control
SA	Sense of achievement
IC	Internal conflict

Health Outcomes:

PhH	Physical health
PWB	Psychological well-being
PF	Positive feelings
NF	Negative feelings
En	Energy levels

Social Context:

Fam	Family/parents
Par	Partner
Fr	Friends/peer-related social network
Uni	University context/work
SC	Situational context

Level 2

Direction of influence:

NI	No influence
Uni	Unidirectional: Construct A influences Construct B but Construct B does not influence Construct A
Rec	Reciprocal: Construct A influences Construct B and Construct B also influences Construct A

Valence of influence:

Pos	Positive: increase in Construct A is related to an increase in Construct B; decrease in Construct A is related to a decrease in Construct B
Neg	Negative: increase in Construct A is related to a decrease in Construct B; decrease in Construct A is related to an increase in Construct B
Amb	Ambivalent: negative and positive combined

Self-regulation mechanism:

Bal+	Cognitions, motivations and emotions are in balance
Bal-	Cognitions, motivations and emotions are not in balance
viaSC	Self-control as an integrator
viaHB	Making up for one health behaviour via another
Csplit	Cognitive split

Notations used in quoting the transcripts in the paper:

….. pauses and hesitations.
[words] words in brackets are researchers words describing the person, situation, or topic the quote refers to.

APPENDIX J
WITHIN-CASE MATRICES

Descriptive Matrices for Participant 1 (Alice)
Health behaviours (general information)

	Alcohol drinking	Physical activity	Healthy eating
Frequency	Low (6-10 days a month)	Moderate (16-20 days a month): I'm certainly active. I'm on a D*** [cheerleading] team so we do *lots* of physical activity…	Low (6-10 days a month): still you gotta have some lee way [junk food]…
Link to other health behaviours		Together with healthy eating are part of healthy lifestyle: That pretty much sums it up, just living a healthy lifestyle and eating right and getting your exercising.	Together with physical activity are part of healthy lifestyle: That pretty much sums it up, just living a healthy lifestyle and eating right and getting your exercising.
Situation	With the team and friends (hanging out)	With D*** cheerleading team, with friends in the gym, alone (walking)	
Researcher's comments	-The frequency is reported for social drinking	-Her physical activity is very frequent, regular and intense: three or four times a week	-She claims to eat right but the frequency of her junk food intake (16-20 days per month) exceeds the frequency of her healthy food eating (6-10 days).

Structure of motivational regulations for HBs

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Yes, 'a little bit', for social drinking: has to do with conformity and social engagement: just because your friends are always drinking and they're like, "O, come out, you never come out with us" and you kind of feel like you're going to be left out of something if you're not out there.	Yes, 'a little': external pressure on the part of her coach: …like my coach is a *big* external pressure… and the self-image motives: I like the size and shape and everything that I am and I want to keep it that way	Yes, 'a little bit': has to do with the influence of media and social norms: like everybody is always talking about … like even in the media and everything about eating well and all that … just like how thin everyone is in Hollywood and stuff like that… and the self-image motives: I think it does affect people because everyone is trying to be the standard size… Yes, 'somewhat' because of avoiding guilt: just because I know it's not good for your body … avoiding foods that you know you shouldn't eat, like greasy foods and chips and stuff like that.
	Against	Yes for binge drinking: It's just guilt, you know you shouldn't have done it…	No	Yes: has to do with the cost and availability of healthy vs junk food: 'not good for you' foods seem to be a lot cheaper than 'good for you foods' so…
Autonomous motivations	For	Yes for social drinking: I am confident when I'm going out that I'm not going to get out of control	Yes: 'really important': It's just important to have a healthy lifestyle; that's something that's really important to me…	Yes: 'very important': It's important to … again just to live a healthy lifestyle so that you're ready to do whatever you need to do.
	Against	Yes for binge drinking: When you respect yourself and your body … you don't overdo it…	Yes, 'somewhat': Somewhat [school interferes]…I don't know, again it's about finding a balance	No
Intrinsic motivations	For	Yes for social drinking: it's just *fun* kind of sometimes…. I enjoy the social part of it… how you can once you have a drink or something you're more likely to be open and having more fun	Yes: I really like being physically active …I just know that it's something that I enjoy doing and like to do and I like the results that it gives me so I do it…	Yes: not strong: Well, not so much the fun but like …a pleasure. I like knowing that … I'm being healthy… I like how it tastes too. It's good.
	Against	No	No	Yes: …if I really want something I'll have it whether it's good for me or not.

Hierarchy of motivational regulations	Leading motivation for	Intrinsic: because it's fun and pleasure to do.. it's just like I don't go out and drink *all* the time it's just every now and then having a social drink with your friends is *fun*.	Intrinsic: that's one of the main reasons… has always been	Autonomous: I cared but it was just kind of like … it's not a big deal and then I took nutrition and I was really amazed at how horrible some of the things that I was eating were… I didn't realize *how* important it was
	Leading motivation against	Autonomous: I tend to be the driver quite a bit		Intrinsic
Dynamics of motivational regulations development		Intrinsic motivation has always been the leading one	Intrinsic motivation has always been the leading one	Controlled: had to do with family history: I've had friends and family that have had diabetes… I think in like my grade ten or eleven year my grandma got it…that just kind of made me realize that there was a chance that I would have it too and that I should start thinking about the choices that I make. Autonomous: after taking Nutrition class: I took nutrition and I was really amazed at how horrible some of the things that I was eating were… I didn't realize *how* important it was
Researcher's comments		-The participant reports no autonomous motivation for alcohol drinking. Still, the analysis suggests that she made her choices regarding social drinking consciously -The participant's intrinsic motivation for drinking is incongruent with her cognitions regarding alcohol drinking, thus adding to the effect of cognitive dissonance: it's just fun sometimes when it's nothing really, it's not a great reason to do it but it's just what you do.	- The controlled component is closely linked with the autonomous one to the point that it is hard for Alice to differentiate between them: "I don't know, you're pushed but it's more of an internal thing too because you *want* to be better and you *want* to be as good as everybody else and you want to keep up…" - Her autonomous motivation against physical activity is not strong and comes into play only when she has to balance her priorities for health and studies and choose school first	-The components against (controlled and intrinsic) are often as strong (or even stronger) as the corresponding components for healthy eating (controlled, autonomous and intrinsic) -The components for healthy eating (controlled, autonomous and intrinsic), they have been recently formed and might still be changing as the participant is still going through the stage of transition from living with the family to living alone -#88, 'Because it's thoughtfully considered and fully chosen' was mot perceived as a relevant question at all: Because I don't … go to the grocery store thinking, "Well, I need to eat healthy so what can I get?"

Health cognitions and incoming emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes	HB Concept	Social drinking as safe and positive Binge drinking as negative	Most important part of a healthy lifestyle All physical activities are related and relevant: it's all kind of connected.. I really like team sports… and I like doing it by myself… and walking	Healthy lifestyle does not exclude occasional treats/junk food: ...I can eat a little bit unhealthy and still make a healthy lifestyle Healthy eating is not perceived as fun but rather as pleasure
	Influence on health		Vital: I don't want to be one of the people that are getting diseases and sick and everything and not being able to live life the way they want to.	Very important: I didn't realize *how* important it was Not immediately seen
PHE (psychological health empowerment)	Self-control	Very important: It's *really* important to me. I don't like the feeling of getting out of control… Has to do with moderation and respect: And it's a respect thing too. When you respect yourself and	Important: like that I have control over how I feel and how I look and everything but it's not a *big* thing. Is needed for living up to 'high standards': I have big high	Very important: you got to control if you have already had your two cookies and you *really* want a third but you like, "No, I won't because I know that I'm full and I'm just craving one"… that's self control

		your body and don't overdo it	standards for myself and I know my friends and family have high standards for me too and I wouldn't want to fail on those …	
	Sense of achievement	No	Yes: when you know that you've done something you've never done before you feel really good about yourself and that you achieved something Important: I enjoy the feeling …and that makes it important to me knowing that I can overcome what I didn't think I could do.	No
Incoming Emotions	Positive	Before social drinking: It's just fun like. During social drinking	After physical activity: in the end you're going to feel really good that you did do it… when you're done it's like a great feeling of like, "Ya, I just did that!"… I love the feeling after.	After: pleasure: It's like the feeling that you get after you know that you're full and you know that what you ate isn't complete junk.
	Negative	Anticipation of guilt	Emotional barriers before physical activity: Well, like it's really… it's hard when you push yourself and you're pushing yourself so hard … it stinks to have to do it	Before/after unhealthy meal: guilt: …well, if you're going to have a *really really* unhealthy meal I always feel kind of guilty about like, "O, I shouldn't have done that" just because I know it's not good for your body…
Internal conflict	Cognitive dissonance	Sometimes yes: Sometimes I feel guilty, like I had class at 8:30 this morning and I skipped it because I was tired, because I stayed out too last night but that's about it. Because it's not prioritizing very well… Sometimes no: it's nice to have a couple drinks but even .. if I couldn't do that I'd be happy with my pop	No, or 'a little bit': there's a little bit of internal conflict if you do want to lay in bed or get up and do what you know you should do but…	'Not normally', 'sometimes yes': I just try not to think about it.
Researcher's comments		-The concept of drinking is split into binge drinking (negative) and social drinking (positive). -Internal conflicts are not strong and short-lasting, as the idea of social drinking is congruent with the concept of healthy lifestyle.	-Physical activity is perceived as one concept including both sports and leisure activities, individual and team/group exercising - Physical activity and healthy eating are integral parts of the concept of healthy lifestyle	- Physical activity and healthy eating are integral parts of the concept of healthy lifestyle -Healthy eating is described in cognitive (pleasure) rather than emotional (fun) terms

Social context and health outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social context	Family	Support social drinking: social drinking and having fun… my parents are always kind of open about it and they don't care	Are physical active: We lived on a farm so whatever physical activity you get doing that…	Diabetes: I've had friends and family that have had diabetes …
	Friends	Support drinking: The friends that I live with up here drink more Do not support drinking: ...but my boyfriend doesn't…	Are physically active: boyfriend and team mates Are not physically active: most of the people I am friends with aren't really physically active	Diabetes: I've had friends and family that have had diabetes …
	Social norms			
	School		Is higher on the priority list than physical activity	

Health Outcomes	Physical Health	Mixed: energy levels fluctuate: Normally you get like more energy when you start drinking and then after, I don't know… Hangover: just because you don't feel good in the morning… have a headache.	Feeling more energy: Yea, more energy Energy as an important outcome: you need energy to do almost everything and being a student and needing to study and do school work. And I find exercising is a really good way for me to take a step back and take a break and go out and refresh and come back and then I can study again	Energy as an important but not immediate outcome: Eating healthy kind of keeps you energized for longer… *technically* it should but I don't know if …
	PWB (psychological well-being)	Mixed After social drinking: guilt: It's just kind of like, "O, I just shouldn't have done that last night" or "Souldn't have had *that* many drinks".	Positive: when I'm physically active …I tend to be happier and more optimistic and everything and I think that's really important too."	Positive: when I'm … eating healthy I tend to be happier and more optimistic and everything and I think that's really important too."
	Social Well-being	Enhanced: I enjoy the social part of it… how you can once you have a drink or something you're more likely to be open and having more fun	Positive: appreciates the atmosphere of her team practices: I like the atmosphere and how you can challenge each other and it's more fun when you're doing anything with other people	
Researcher's comments		-Social norms are not quite in the picture - social well-being was mentioned even more often than physical health and psychological well-being - While alcohol drinking had admittedly positive implications for social well-being, the other two outcomes were described as mixed	-The defining feature is that the outcomes (physical, psychological and social well-being) always feel positive, even when she feels sore -Health outcomes for physical activity and healthy eating are related	-Health outcomes for physical activity and healthy eating are related -Positive outcomes, although recognized by the participant, are not experienced immediately and therefore are not appreciated as much as the outcomes of her physical activity -Physical and psychological outcomes are related: I think if you're not healthy then you can't be happy.

Relational Matrices for Participant 1 (Alice)

Motivational regulations for HBs

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Are supported by indirect peer pressure for social drinking	Are supported by coach and team direct and indirect influence Are supported by the feeling of guilt that she experiences when she skips physical activity: I always feel guilty when I don't go to the gym just because I know that I should. Are supported by family upbringing	Are supported by family and friends history of diabetes, social norms Are supported by the feeling of guilt
	Against	Are supported by negative friends examples: I've seen way too many people do really stupid things and make fools of themselves and embarrass themselves and I just know that I don't want that Are supported by negative emotions and adverse outcomes of excessive drinking		Are supported by external factors of high cost and low availability of healthy food versus low cost and high availability of junk food
Autonomous	For	Are supported by belief in strong	Are supported by strong	Are supported by strong

motivations		PHE	cognitions (health attitudes and PHE), friends and positive social well-being outcomes	cognitions (health attitudes and PHE), and positive health outcomes (physical and psychological well-being) Are undermined by the absence of immediate outcomes
	Against	Are supported by strong cognitions against excessive drinking	Are supported by school being a higher priority	
Intrinsic motivations	For	Are supported by positive emotions experienced during drinking and positive social well-being outcomes	Are supported by strong positive emotions after exercising, regularity of practice and positive physical and psychological outcomes	Are supported by positive emotions Are undermined by poor ability to cook: I think I do a lot more physical activity than I do healthy eating just because I live in dorms and I'm not too much of a great cook …
	Against			Are supported by strong positive emotions
Researcher's comments		-The influence of indirect peer pressure is downplayed by the participant. -She can use cheating to deal with peer pressure: Last night everybody was drinking and because one of the guys found out that he's not going to be able to drink for quite a while (haha) so they were drinking last night and like, "O, come out!" So I filled up my water bottle with Crystal Light and none of them could even tell the difference. They were like, "O, what are you drinking?" and I was like, "O, its vodka and Crystal Light" when it was not, and they were like, "O, you can't even taste the vodka" and I was like,"'Yea, I know, (haha) how amazing!" (haha)	-Regularity of practice helps develop and support the intrinsic component of motivation for physical activity	

Health cognitions and incoming emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes		Are defined by family attitudes and practices: "[they] encourage social drinking and having fun …I've learned from them whenever I started drinking to do it in moderation and be responsible with it	Are defined by family values and upbringing: it's kind of just how you've been brought up, even just values and morals that you have Are supported by positive outcomes Have adverse influence on emotions Add to autonomous motivation for physical activity	Are defined by family practices and social norms Are supported by positive health outcomes Add to autonomous motivation for physical activity
PHE (psychological health empowerment)	Self-control	Is encouraged by family: they have never been the type to be like, "No you can't drink" which I think really helped me with my control Supports autonomous motivation for social drinking and autonomous motivation against excessive drinking	Is supported by family Is supported by positive outcomes Has adverse influence on emotions Adds to autonomous motivation for physical activity	Is supported and challenged by eating practices Is supported by family and positive outcomes Supports healthy eating practices Adds to autonomous motivation for healthy eating

Incoming Emotions	Positive	Are extended by alcohol drinking with implication for PWB: it just kind of extends the mood that you're in, so if you're in a really good mood and then have a couple of drinks while you're then going to be in a great mood and having fun Support intrinsic motivation for social drinking and controlled for excessive drinking Support health attitudes and self-control: …good feeling of being in control…	Support controlled and intrinsic components for physical activity	Are affected by eating practices Support controlled and intrinsic components for healthy eating Support intrinsic component against healthy eating
	Negative	Are extended by alcohol drinking with implications for PWB: it just kind of extends the mood that you're in… I've never been like a really sad person but lots of my friends are and like when they start drinking it just extends their sad mood and they get really upset and cry and depressed…	Create barriers for regularity of physical activity Emotional barriers are overcome by exercising self-control	Are affected by eating practices
Internal conflict	Cognitive dissonance	Is created by the contradiction between motivational regulations (controlled for conformity and intrinsic for coping), emotions (guilt) and cognitions (self-control and ability to prioritize well)	Is created by contradiction between emotions and cognitions Is controlled by strong cognitions (health attitudes and PHE): I know that I will feel better once I get up and get doing something but it's so hard to get out of bed some mornings	Is created by contradiction between emotions, motivations and cognitions but : I just try not to think about it.
Researcher's comments		-An interesting observation was about moderating role of alcohol drinking when it comes to emotions and their implications for the psychological well-being (extending the mood you are in)		

Social context and health outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social context	Family	Define health attitudes Support and teach PHE	Define health attitudes Support and teach PHE: I know that they are behind me in whatever I do Add to controlled motivation for physical activity	Define health attitudes Support and teach PHE Add to controlled motivation for healthy eating: I think that [family history of diabetes] kind of influences your choices a little bit more. If you're at risk for things like that you're more likely to eat a little bit healthier
	Friends	Mixed influence: Indirect support for controlled motivation for social drinking Indirect support for controlled motivation against excessive drinking: And then I tend to *not* drink as much just because he's not [boyfriend] Direct support for frequency of alcohol drinking	Support autonomous motivation for physical activity Support regularity of physical activity No influence from friends who are no physically active	Add to controlled motivation for healthy eating

	Social norms			Affect health attitudes Add to controlled motivation for healthy eating
	School		Contradictory influence: Adds to autonomous motivation against physical activity Adds to autonomous motivation for physical activity: I've always been pretty physically active but this year I kind of stepped it up a notch... you always hear about people coming to university and gaining the freshman 15 or whatever it is and I knew I didn't want to do that so I didn't	
Health Outcomes	Physical Health	Adds to controlled motivation against excessive drinking	Supports health attitudes and strong PHE Adds to intrinsic motivation for physical activity	Supports cognitions Supports but at the same time undermines autonomous motivation because: I don't notice it enough to have it be really really important to me
	PWB (psychological well-being)	Adds to controlled motivation against excessive drinking	Supports health attitudes and strong PHE Adds to intrinsic motivation for physical activity	Supports cognitions Supports but at the same time undermines autonomous motivation because: I don't notice it enough to have it be really really important to me
	Social Well-being	Adds to controlled motivation against excessive drinking Adds to intrinsic motivation for social drinking Helps in socializing with friends	Supports health attitudes and strong PHE Adds to autonomous motivation for physical activity	
Researcher's comments		-Her family influence her both directly and indirectly, by teaching her health attitudes, providing support for her basic psychological needs and boosting her psychological health empowerment	-Physical activity and healthy eating are closely related in that their joint influence brings about positive outcomes.	-Physical activity and healthy eating are closely related in that their joint influence brings about positive outcomes.

Other influences

		Alcohol drinking	Physical activity	Healthy eating
External Factors	Cost			Add to controlled motivation against
	Availability			Add to controlled motivation against
Internal Factors	Ability to cook			Add to intrinsic motivation for
Researcher's comments				

HBs regulation mechanisms

		Alcohol drinking	Physical activity	Healthy eating
Motivational regulations-emotions-cognitions interaction	In balance	Yes to social drinking:	Yes	Yes: I try and do my best but if it's not going to work out then I don't freak out about it because I realize that life happens and you're not always going to be able to do exactly what you want.
	Not in balance			
Role of self-control	Planning	Yes: I am confident when I'm going out that I'm not going to get out of control and I know my limits and everything, so I know that I'm fine to go and have a good time with my friends.	Not much	Yes now: you got to control if you have already had your two cookies and you *really* want a third but you like, "No, I won't because I know that I'm full and I'm just craving one"… that's self control Yes for the future: I think I could eat a little bit healthier... I have the will power to… I just don't feel the need to set my mind to it right now
	Integration		Yes, to make up for 'lee ways' with junk food	Yes, to make up for 'lee ways' with junk food: Just because you know you shouldn't have … and you did and "o, well"… go to the gym
Cognitive split		Yes: social drinking is congruent with healthy lifestyle		Yes: occasional junk food is fine with healthy lifestyle: I think I'm physically active enough that I can eat a little bit unhealthy and still make a healthy lifestyle.
Researcher's comments		-Motivational regulations are closely tied in with her cognitions and emotions and together define her behavioral choice regarding alcohol drinking. -When motivational regulations are congruent with her emotions and cognitions, she experiences positive outcomes. - When motivational regulations, emotions and cognitions are not in balance she either experiences negative/mixed outcomes or she exercises her self-control and chooses not to drink to avoid those negative outcomes. Such decisions of hers often have to do with compromises or elements of cheating. -Self-control does not play an important role in integrating alcohol drinking with other health behaviours because social drinking is part of the participant's concept of healthy lifestyle.	-Her motivational regulations, cognitions and emotions are balanced so that : if I miss one I'm not obsessive about it, you know like, it's fine. -For the same reason, self- control is not 'a big thing' in physical activity	- Cognitions, emotions and motivations tie in into an ambivalent mix when it comes to eating.

Descriptive Matrices for Participant 2 (Becky)

Health behaviours (general information)

	Smoking	Alcohol drinking	Physical activity	Healthy eating
Frequency	Low (6-10 days a month): I always have to have like *one* cigarette, like one cigarette per week.	Very low (1-5 days a month): because alcohol is such an important subject in most people's lives … and in mine I try to avoid alcohol all together… because ever since I had my daughter I *barely barely barely* ever went out.	Moderate (16-20 days a month): physical activity has always been a major thing in my life.	Moderate (16-20 days a month)
Link to other health behaviours	after alcohol drinking when going out	promotes smoking when going out	works together with healthy eating to fight diabetes	works together with physical activity to fight diabetes
Situation	alone or with friends (going out)	with family (celebrations) and friends (going out)	walking and running with her daughter, or walking and running alone, sports	alone, with her daughter
Researcher's comments	- smoking coexists well with her alcohol drinking, because they are part and parcel of the "socializing package" among her friends: "… whenever I go out with my friends … and have liquor I probably have like one cigarette a night and that's it."	- conceptualizes social drinking and alcoholism separately	- Physical activity and healthy eating coexist as two essentials because of her illness	-Healthy eating is a long established practice:"… I was the healthiest one [in the family]… all the way…. I never drank pop. And then when I hit 17 I found out I was a diabetic…"

Structure of motivational regulations for HBs

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	says 'no' but then admits external influence (friends, situation): I would say it's influential. Like from my friends… if they will be smoking outside and I'll be standing out there … *watching* them?	'somewhat', aware of external influence: everybody in my family drinks and I didn't want my daughter to go through that so… I moved away Friends: when we meet up again we always find our way to a bar or a pub or something Mainstream culture: "…because alcohol is such an important subject in most people's social lives …	'no' but admits external influence of negative example (sisters): ...because I don't wanna be overweight like my sisters	'somewhat' to avoiding guilt: Because I don't want to look on my sugar monitor and see that it's high, I want to keep it as good controlled.
	Against	Yes, against chain smoking because of family history of lung cancer: ...my father had lung cancer and so he passed away from smoking, he smoked every day of his life… I just have a pack of smokes on top of my fridge which I keep as a reminder for me all the time of my dad… External influence of her daughter: don't want her to see me on alcohol or smoking, I want her to know that I live a healthy life and I'm trying really hard for her Feeling of guilt: I do feel guilty after I smoke	Against alcoholism because of family history, diabetes: I know what alcohol can do to a family...	Minor, relates to school load: Sometimes I can't find the time for it……because on my busy days I'm always here at the university sitting down at a computer…a lot of cram time for books…	Not easy available: it's hard to find healthy foods with low sugars in. It's a major struggle because I'm always having to look for sugar twin for my coffee and I need to look for the non-fat stuff and zero-sugar, zero-glucose all that
Autonomous	For	yes to chosen and	yes to chosen and	yes, because it's	yes, because it's

motivations		considered (words it as 'my choice', especially strong for smoking alone): I don't have to prove anything to anybody. It's just me it's my choice so I sit down and just try to relax	considered (words as 'a choice' to go out or not, how often, be a driver): I always think everybody has a choice to do whatever they wanna do …… and they don't have to choose going out to get hammered everyday or every week or something like that.	important (to stay healthy with diabetes), yes to chosen and considered (not to be overweight): It's important to me because when I take insulin I have to eat and then right after I eat I have to work the insulin throughout my body so I have to keep on constantly moving… Mostly I exercise because of my sickness and … because I don't wanna be overweight like my sisters…	important (to stay healthy with diabetes), yes to chosen and considered (diet plan): it's fully chosen because I always gotta watch what I eat. And because whenever I make supper my daughter is gonna eat it too
	Against	Yes, against chain smoking: I don't want to be a chain smoker …	Against alcoholism: I want to be in control of my life… and not the bottle in control of me		
Intrinsic motivations	For	says 'no' but experiences positive feelings: happy, relaxed, in tune with myself	'a little bit' because means socialising and 'having fun' (part of which is acting 'irresponsible') which is important	'yes' because experience positive feelings from sports : For fun, I'm a very competitive person.. I like volleyball… soccer… I like all these kinds of games, running games mostly	'yes' because loves cooking and healthy snacks.
	Against				'Yes' loves to try new foods: sometimes I just wanna flop off my diet… I want to try some foods um… I want to try different foods
Hierarchy of motivational regulations	Leading motivation for	autonomous: because it's thoughtfully considered and chosen	autonomous: because it's thoughtfully considered and chosen	autonomous: because it's important and thoughtfully considered and chosen	autonomous: because it's important
	Leading motivation against				
Dynamics of motivational regulations development			Controlled Intrinsic Autonomous	Intrinsic the autonomous and controlled components developed when she learned about her illness and the issues of weight management came up	
Researcher's comments		- external factors for and against smoking almost balance each other - intrinsic motivation is overridden by autonomous motivation: [these positive feelings are] not so much [important], I could cut it out if I wanted to …. because I just started smoking in this year. I quit for two years.	-external factors against drinking override factors for drinking - Intrinsic motivation is overridden by autonomous motivation because of the importance of self-control	intrinsic: enhances autonomous motivation because of strong positive feelings controlled: in indirect way (negative example)	intrinsic: enhances autonomous motivation because of positive feelings about oneself - controlled: in indirect way (negative example)

Health cognitions and incoming emotions

	Smoking	Alcohol drinking	Physical activity	Healthy eating

Health attitudes	HB Concept	Helps deal with stress	[it's important to have control over oneself] because … when my parents were … like *all* of them they don't have self-control when it comes to alcohol. Like the alcohol rules their lives	Health is a priority because of diabetes: Just staying active, watching what I eat	Health is a priority because of diabetes: Just staying active, watching what I eat
	Influence on health	Positive: for PWB Negative: concerns about trouble breathing	Bad for diabetic people: it's important to me because … um … being a diabetic I really *fight* with having energy because I have to take insulin…	Always positive	Always positive
PHE (psychological health empowerment)	Self-control	Strong	Varies: opts for driver when exercise it: I try to avoid alcohol all together…	Strong	Strong: Has to be strong all the time: *All* the time….I have to keep saying to myself, 'You're watching your sugar… You're doing this for your daughter … You have to remember to keep your … to keep calming your um… sugar intake … and remember your insulin'
	Sense of achievement			Yes: I feel a sense of achievement... because then I realize, 'Hey I did it another day, I got more energy...I got my exercise for today'.	Yes: Because I get to check my sugar later and I know it's low and I know I'm doing something good.
Incoming Emotions	Positive	Anticipation to relax, get clear thinking, feel positive about oneself: It helps me like it makes me relax and then I start thinking about the good stuff and the good things in my life	Anticipation to relax: it helps me unwind	Anticipation to feel positive: Whatever conflicts that came to me I'd be able to run and think.	Feeling positive about oneself: Positive because I'm eating right, watching my diet…
	Negative	Makes feel guilt, apprehension: Because of my health and … mainly because of that … and I don't want my daughter to see me smoke.	Fear, anxiety, apprehension: Before I go out I'm kind of scared, I feel scared. Like it could start off good but then … everything could just … crumble. Like you never know what happens when you go out… and during it, I feel … I don't know… anxious. Because the people that I'm with … umm… knowing how crazy they are ...	Conflicted : Whatever conflicts that came to me I'd be able to run and think. concerns that it's time-consuming: I feel negative before I go because I really contemplate on how … on how this is going to benefit me… Am I going to be tired? Am I going to be able to stay up and read another book?	Disappointment (when cannot try some foods) Apprehensions, guilt (when eating unhealthy): Because I don't want to look on my sugar monitor and see that it's high, I want to keep it as good controlled
Internal conflict	Cognitive dissonance	Yes	Yes: Half of me wants to go out … and get drunk whatever … but the other half tells me, 'You have to be responsible' because I have these little eyes looking at me.	Sometimes: 'it depends on the day': Like if it's warm out then I'd like to be outside but when it's really cold I kinda dread going outside…	Yes: Negative because I want to try some foods um… I want to try different foods but I can't because they are bad …too much sugar in it.
Researcher's comments					- Conceptually, junk food is not in the picture because of the strict diet, the concept of 'treat' is also different: [when] I know that it[sugar]'s down … I could treat myself to a juice or something. I always look forward to juice.

Social context and health outcomes

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Social Context	Family	Family history: my father had lung cancer and so he passed away from smoking, he smoked every day of his life	Family history: mother's on dialysis, everybody in the family are alcoholics Parents: alcoholics: the alcohol rules their lives…they plan stuff around their alcohol	Family history: father was diabetic, sisters are overweight	Family history: father was diabetic, sisters are overweight Daughter: I was always trying my best to stay healthy … because I always gotta watch what I eat. And because whenever I make supper my daughter is gonna eat it too I have to make it [healthy food] look attractive for her to eat so she'll keep eating it…
	Friends	Heavy smokers: I got some friends [3 chain smokers] that smoke… like they smoke heavily	Binge drinkers: 'sky's the limit for them'		
	Social Norms	Smoking and drinking among her friends: whenever I go out with my friends … and have liquor I probably have like one cigarette a night	Is essential part of socializing: …because alcohol is such an important subject in most people's social lives …		
	School			time concerns ('can't find the time for it') because of university studies	
Health Outcomes	Physical State	Energy drainer: I think it takes away some of my energy… and that energy I could have been using with *her* [daughter]… playing games…	Energy drainer (very strong): being a diabetic I really *fight* with having energy because I have to take insulin… when I drink alcohol my sugar skyrockets… … and then I feel really drowsy and I don't have energy but I force myself to do it. I force myself to get up and walk around.... … I feel like it slows me down, takes up my energy, the time I could be spending with her…	Feels to be in the best shape of her life	Energy booster (when combined with exercising): It helps me burn off my energy quicker if my sugar is controlled and that has to do majorly with my food that I eat … cuz if I eat … if I eat a piece of bread I feel sleepy. So then I have to get up right away and I have to work out or do something… Weight control: ..it keeps my weight off..
	PWB (psychological well-being)	Mixed Makes feel fully relaxed, get clear thinking, feel positive about oneself: ….and by the time I'm done with my cigarette I'm fully relaxed and I can just think clearly. Makes feel guilty: I do feel guilty after I smoke	Mixed Makes feel relaxed, positive, confident, proud, have fun: I can act free. I can drink and I can just sit down and relax, nobody is judging me… I just sit there and have fun. ...sometimes I'm proud of myself for doing something that I do that I normally don't do… so I don't sing in front of people, but when I feel good I do tend to sing Guilt, embarrassment: Because the people that I'm with … umm… knowing how crazy they are I feel guilt afterwards ...	Always positive: happy, good about oneself, clear thinking, have fun: It makes me feel good about myself. I feel happy… knowing that I did something fun and my daughter can enjoy it with me… Whatever conflicts that came to me I'd be able to run and think. Think about everything I'd be feeling a lot better because I knew I went out there and became one with nature and ran … and just got to think about Guilt (when skipping)	Mixed: a little bit of both. Positive because I'm eating right, watching my diet… Negative because I want to try some foods um… I want to try different foods but I can't because they are bad …too much sugar in it.

	Social Well-being		Enhanced: ...sometimes I just need to go and have fun with my friends…		
Researcher's comments		- Although she is fully aware of its negative outcomes, she feels that for the moment its positive outcomes outweigh the negative ones			

Relational Matrices for Participant 2 (Becky)

Motivational regulations for HBs

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Are supported by indirect peer pressure and social norms among her friends to drink and smoke	Are supported by indirect peer pressure and social norms among her friends to drink and smoke Is encourages by family and friends	Are supported by by family (mom and daughter)	Positive emotions and direct influence of daughter: Just knowing that I have my little girl there with me, she's always telling me, 'Right on, mommy!' She is always encouraging me
	Against	Are supported by family history of lung cancer, bad effect of smoking on physical health, and negative incoming emotions of apprehension	Are supported by family history of lung cancer, bad effect of alcohol on physical health, and negative incoming emotions of apprehension	Sometimes, school load impedes	Affected by external factors of availability
Autonomous motivations	For	Are supported by health attitudes that her PWB is more important than your physical health at the moment, her PHE (that she can control it) and by her previous experience of successfully quitting smoking	Are supported by health attitudes that is good for PWB, her PHE (that she can control it)	Are supported by health attitudes that is good for health, her PHE by positive effects on physical health	Are supported by health attitudes that is good for health, her PHE by positive effects on physical health
	Against	Are supported by her strong health cognitions	Are supported by her daughter encouraging her that she can do it and health attitudes against alcoholism		
Intrinsic motivations	For	Are supported by her positive incoming emotions and positive PWB	Are supported by her positive incoming emotions and positive PWB	Are supported by her positive incoming emotions and positive PWB	Are supported by her positive incoming emotions and love for cooking
	Against				
Researcher's comments		-autonomous and intrinsic motivations for smoking are interrelated -emotions and PWB are the strongest influneces			

Health cognitions and incoming emotions

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Health attitudes		Are defined by mixed influence of family history, negative example of parents, siblings and former husband, desire to become a positive role model for her daughter Negatively influenced by positive incoming emotions Add to the feeling of guilt and apprehension Influence autonomous motivations	Are defined by mixed influence of family history, negative example of parents, siblings and former husband, desire to become a positive role model for her daughter Add to autonomous motivation against heavy drinking	Are defined by mixed influence of family history, negative example of parents, siblings and former husband, desire to become a positive role model for her daughter Add to autonomous motivation for	Are defined by mixed influence of family history, negative example of parents, siblings and former husband, desire to become a positive role model for her daughter Add to autonomous motivation for
PHE (psychological health empowerment)	Self-control	Self-control is challenged by negative family influence (parents, siblings). Supports autonomous motivations against chain smoking and for occasional smoke to relax. Smoking helps regain self-control in stressful situations: I would say that's a major part… of why I smoke sometimes… Let's say I had a really stressful argument with her father and I had her with me… the way that I'd probably deal with that was … I'd probably try to take a break out for myself… sort through some thoughts and the best thing and the best way I could do this is just to step outside and have a cigarette.	Is negatively affected by drinking: The not so good side is …umm … some of the choices you make when you are drinking, yea, that's what I don't like about alcohol. I don't like alcohol because … I don't have control … over myself	Makes feel in self-control: makes you be in self control	Ambivalent influence of healthy eating: makes feel in self-control... always a challenge [to it]
	Self-confidence		Both self-confidence and sense of achievement are enhanced by AD: sometimes I'm proud of myself for doing something that I do that I normally don't do… so I don't sing in front of people… so it gives me courage, liquid courage, I guess.		
	Sense of achievement				
Incoming Emotions	Positive	Are negatively affected by smoking frequency and cognitions against smoking Are supported by positive PWB Support intrinsic	Encourage drinking: when I'm happy and around certain family members I haven't seen in a long time… then I will go and have like a couple of drinks… Add to intrinsic motivation for	Are supported by frequency of physical activity, Support intrinsic motivation for	Are supported by healthy eating, Support intrinsic motivation for

		motivation for	Are negatively affected by family and friends		
	Negative	Support intrinsic motivation for and controlled motivation against	Discourage drinking: when I'm depressed I don't wanna go drink. Add to intrinsic motivation against		Are effected by healthy eating restrictions Support intrinsic motivation against
Internal conflict	Cognitive dissonance	Is created by the contradictions between motivational regulations, cognitions, incoming emotions	Is created by the contradictions between motivational regulations, cognitions, incoming emotions		Is created by the contradictions between motivational regulations, cognitions, incoming emotions
Researcher's comments		-History: self-control helped stop smoking 2 years ago and controls the habit now	- Since alcohol drinking has an adverse effect on her feeling of self-control, often opts out for being a driver or not going at all		

Social context and health outcomes

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Social Context	Family	Define cognitions Adds to controlled motivation against Encourage decrease in smoking frequency: I don't want my daughter to see me smoke ... if my daughter asked me to [quit] I would do it...	Negative example of parents adds to controlled and autonomous motivations against, defines cognitions: I know what alcohol can do to a family... Like the alcohol rules their lives… I don't wanna be that way. I want to be in control of my life… and not the bottle in control of me. Mom's support adds to cognitions, motivations against: that I don't have to do this because of my friends…you can take your time off…offer to be the driver next time Strong motivator against alcohol drinking, adds to controlled against : ..she gets up in the morning, she asks me 'Mommy, were you drinking?...Why did you have to do that?' 'if my daughter asks me to quit I would quit''I want her approval' Desire to be a role model for her daughter adds to autonomous motivation against: I wanna be someone…my daughter can look up to, she doesn't have to feel embarrassed of',	Negative example of siblings adds to controlled motivation for, defines cognitions: sedentary lifestyle 'sit around and watch TV'	Negative example of siblings and father adds to controlled motivation for, defines cognitions: sisters are overweight and do not watch what they eat I've seen him [father] suffer with his diabetes... like him keeping it low and seeing what he had to do …… it just seemed like a tiring life for him and I didn't want that for me
	Friends	Add to controlled	Encourage, even		

		for: I would want to feel involved so I would say, "hey, give me a smoke"	press: 'everything's ok to do, no one is gonna tell you'No, you can't do that!' 'Why are you acting like such an old lady?' 'when we meet ..we always find our way to a bar or a pub or something'		
	Social Norms	Add to controlled for	Add to controlled for		
	School			School load adds to controlled against: ('can't find the time for it') because of university studies	
Health Outcomes	Physical State	Under negative influence of smoking Adds to controlled motivation against	Under negative influence of alcohol drinking: when I drink alcohol my sugar skyrockets	'yes', strong positive influence by PA: I do it because of my sickness, I guess… I have to do some kind of exercise *every* day otherwise if I don't do that my sugar will get up there, I will get sick…	'yes', strong positive: helps work insulin throughout the body, keeps sugar under control.
	PWB (psychological well-being)	Under mixed influence of smoking Adds to intrinsic motivation for smoking, positive incoming emotions	Under mixed influence of alcohol drinking	Positive after PA: this way my negativity would be altered to be brought forward you know and shown to anybody else. Physical activity helped fight anger problem back in high school	
	Social Well-being	Adds to positive incoming emotions	Positively affected		
Researcher's comments				-a long history of positive influence on PWB: physical activity (running) helped fight anger problem in high school	

Other influences

		Smoking	Alcohol drinking	Physical activity	Healthy eating
External Factors	Availability				Availability of resources: healthy foods do not always looks attractive, some foods are not easy to find, expensive, while fast foods are attractive, easily available and cheap.
Internal Factors	Ability to cook				Yes, loves to cooking: [likes to] make it fun but healthy
Previous experience		Supports autonomous motivation for			

Researcher's comments					

HBs regulation mechanisms

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Motivational regulations-emotions-cognitions interaction	In balance				
	Not in balance		Yes		Yes
Role of self-control	Planning	Yes, except when with friends	Yes, but does not always work fine:	Yes	Yes: *All* the time….I have to keep saying to myself, 'You're watching your sugar… You're doing this for your daughter … You have to remember to keep your … to keep calming your um… sugar intake … and remember your insulin'
	Integration		Yes, important for integrating with other aspects of life, otherwise: Like the alcohol rules their [parents]lives…I want to be in control of my life… and not the bottle in control of me.	Yes, running returns self-control that she need for other aspects of her life: makes you be in self control.	
Cognitive Split		Yes, temporal(occasional) versus chain smoking	Yes, social drinking versus alcoholism		
One behaviour makes up for another					Yes, via physical activity: I know that my sugar's doing good [after PA] and it's down and I could treat myself to a juice or something.. . It helps me lose weight…
Comments		-emotions take over cognitions in stressful and unclear situations: a stressful situation that I don't know how to do deal with like with… let's say my mother's on dialysis and …if she got like any sicker then I'd probably go back to being a chain smoker because it helps me deal with decisions that I need to make for her.	-Self-control is an overarching concept for all health behaviours but for alcohol drinking in particular, because of family history and parents being alcoholics.		

Descriptive Matrices for Participant 3 (Colton)

Health behaviours (general information)

	Alcohol drinking	Physical activity	Healthy eating
Frequency	low (6-10 days a month) but higher at the time of the survey	Moderate (16-20 days a month): I go to the gym five days a week, strictly off limits on weekends – that's my time to relax, cool down	High (21-25 days a month) with occasional treats: I give myself a treat here and there.
Link to other health behaviours		Healthy eating:	Physical activity

Situation	With family, friends, at dinner, at special gathering: I'm personally not a big fan of wine, but I still have one here and there. And at like special like family gatherings, pretty much everybody's having a drink	Alone in the gym, seasonal sports (golf, hockey): I play sports here and there. I play golf over the summer, and play a little bit of hockey in the winter, just as an extracurricular sort of thing.	
Researcher's comments	The participant changes (lowers) the frequency: if I went on the past three days, it's probably been eleven to fifteen since I had one. Actually I think maybe when I did this I just came off a weekend of drinking -He differentiates between controlled/regulated drinking and drinking as an addiction		-Unhealthy food is perceived as a treat: I give myself a treat here and there.

Structure of motivational regulations for HB

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	'No', then 'minor pressure' of family drinking culture and social norms: with external pressure, it's pretty.. minor pressure I guess – like everybody in my family drinks and my parents are wine drinkers at dinner, and all the time they'll say, "Colton, would you like a glass of wine?" and I'm pretty good for saying no, but sometimes I'll just say whatever, sure, I'll have some.	Self-image motive: ...to be honest, I don't want to be fat… that really got me scared ... Social norms of body shape to be sign of health: …you can always tell just by looking at a person, like you know they take care of themselves, they respect themselves... because they keep themselves in shape, they look after themselves...	'No', then 'natural 'external pressure from living with parents: I have a pretty good diet right now, and ... mostly that's responsible for my mom because she does all the grocery shopping. And she makes really smart choices Self-image motives: like people who I guess you could say, eat like crap look like crap ... if I was obese it would be a self-esteem issue for me, um because ... people would be saying that about me and looking at me in that sort of way
	Against	'Yes' against addiction: I have parents that drink and stuff, so I kind of saw it all around me all the time... but nothing in extreme		Minor external pressure from friends who are Mac Donalds eaters
Autonomous motivations	For	'Thoughtfully considered or fully planned', for social drinking: I do plan on going out and drinking a little bit... if I'm going to be getting drunk or something, before I get too far I make sure I can get home 'Fully planned', for binge drinking: as far as binge drinking goes, usually that happens when it's kind of like a planned event ... like when I go out to like the lake or something with friends	'Important': it's a good thing and it is important to me	'Important': ...I think diet should be important for everyone ... there is nothing bad that comes from being healthy
	Against	'Yes' against addiction: [against] become like, addicted or an alcoholic sort of thing. That's a little extreme		
Intrinsic motivations	For	'Fun': Like it is fun, I'm not going to say it's not. When I go out with my friends, I have a good time. Let's you unwind, loosen up	'Fun' and pleasure: I enjoy going to the gym ... I actually love going ... you know, just running on the treadmill, listen to some music, ...or just lift some weights	'Not fun' but 'normal': It's not fun at all...I feel normal I guess. Like I don't feel good about myself that I ate a good meal, but I don't feel bad about myself for eating a good meal, it's just – I just feel normal, fine, it's what I'm accustomed to. It's what it's always been like.
	Against			'Yes' for fast food: I give myself a treat here and there... I enjoy a pizza from Pizza Hut and I don't feel bad about eating it ... never
Hierarchy of motivational regulations	Leading motivation for	Autonomous and intrinsic: 'tie in together': ... if I haven't considered it and thought ahead about the times or what I'm going to be doing for the night, well, then I'm not going to drink, but if I do think about it, then	Intrinsic: the main… the reason I go is it's something I enjoy doing.	

		sometimes I do drink ... and enjoy it		
	Leading motivation against			
Dynamics of motivational regulations development		Controlled and intrinsic: ... earlier in high school, it would probably be external pressure, like friends have a big influence on you... Autonomous and intrinsic: it changed when I was nineteen... I'm like, alright, I'm older, I don't really need to do that anymore, I'm more responsible than that	Intrinsic: it's fun and a real pleasure. Controlled and autonomous (and controlled became less influential): at the start it was 'cuz like I put on a whole bunch of weight and I wanted to get rid of that, so I joined a gym and started exercising. Um, but I guess that pretty much changed after the four month period once I lost all that weight – I was back to where I was and then I just kept going for strength training and stuff after that.	
Researcher's comments		- Autonomous and intrinsic components of motivation for alcohol drinking "tie in together" as the leading components of his current motivational regulations for alcohol drinking -From his high school years, his motivational regulations for alcohol drinking gradually developed from controlled and intrinsic to mostly autonomous and intrinsic - The participant rejected controlled motivation for all the behaviours and the influence of external factors emerged during the interview. Could be because of misunderstanding the question or underplaying the role of controlled motivation.	-Regarding its dynamics and the current hierarchy, although it started out with the controlled motivation being the strongest, gradually autonomous motivations came into play and the intrinsic component has always been there and now takes the leading position in Colin's motivational structure for physical activity. - The participant rejected controlled motivation for all the behaviours and the influence of external factors emerged during the interview. Could be because of misunderstanding the question or underplaying the role of controlled motivation. -With physical activity, controlled motivation that was revealed by the survey was different from that reveled in the interview: Self-image motives link physical activity with healthy eating, based on previous experience	-The participant rejected controlled motivation for all the behaviours and the influence of external factors emerged during the interview. Could be because of misunderstanding the question or underplaying the role of controlled motivation. -Self-image motives (controlled motivations) link physical activity with healthy eating, based on previous experience

Cognitions and Incoming Emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes	HB Concept	Controlled/social drinking as positive Binge drinking as social: I guess as far as binge drinking goes, usually that happens when it's kind of like a planned event, you could almost say, like when I go out to like the lake or something with friends, it's almost expected that's kind of what's going to happen Addictive drinking as negative Social in nature: family gatherings or going out with friends:	Important part of healthy lifestyle Relates to image and reslf-respect: you can always tell just by looking at a person, like you know they take care of themselves, they respect themselves, almost you could say because like, they keep themselves in shape, they look after themselves, it's a good thing and it is important to me, like health is a pretty important All physical activities are related and relevant: it's all kind of connected.. going to the gym… playing some sports like hockey and golf...	Important: I think health is important, there is nothing bad that comes from being healthy, aside from maybe like, not eating McDonalds or something Occasional fast food is a treat: I do eat fast food here and there. I enjoy a pizza from Pizza Hut and I don't feel bad about eating it or anything – never.
	Influence on health	Aware of negative long-term effects: …in the long run the negative effects on physical health outweigh all the positive one when it comes to excessive drinking.	Important: keeps me in shape, every – all the cardiovascular benefits and everything. I don't, can't honestly give a reason why it's not good to work out or anything or go to the gym.	Positive: Health is a big deal, like people who I guess you could say, eat like crap look like crap.

PHE (psychological health empowerment)	Self-control	Very important: self-control to me is the true show case of strength Is understood as physical, mental and spiritual strength: It's just I think of a lack of self-control or a lack of spiritual-control, and lack of physical-control is becomes of your weakness. All of these things make me feel strong there as well.	Minor: like in my mind eighty percent of the work is just getting to the gym because ... once you're there, you're there ... when I skip, like say I take a week off, next week I even notice that I just don't feel like going ... like I get out of routine..."	Important to be smart about choices: "smart-control": it's not really self-control – it's like smart-control I mean. Um, because sometimes I do have like Chef Boyardee or something for lunch, just here and there. Uh I try to be smart about it and make good decisions for myself but I'm not perfect... like I'll toss in a granola bar and not even think twice about it or anything...
	Sense of achievement	Sense of achievement: there is always achievements or lack of achievement that all defeats the way that I feel… how well I set to stay with the guidelines that I set before...	Yes, more than self-control ...not really self-control but self achievement...I feel ...good about it, you know I'm happy I went.	Yes: Because I like knowing that I am eating well, and then for some achievement that I always feel good about myself after,
Incoming emotions	Positive	During binge drinking: help avoid guilt: …at the time I felt like it was right…. I could just put off the guilt, put off the pressure, and just avoid all the fingers pointing at me. Before social drinking: excitement: …before I usually just feel fine, you know, just getting ready to go out, I've been pretty relaxed, going out to see some friends. Just feeling I guess, normal … positive, because I am thinking I am in control and I know kind of everything that will go on and I will be able to control it. During social drinking: enjoyment, sociality: Then, during, It's fun, because I am at a party with my friends …I enjoy what it is, I enjoy its taste	During physical activity: enjoyment: ...once I'm there and I'm doing it, I'm like 'I'm so glad I came, I'm glad I'm here'. I'm enjoying this	Before and during: feeling good about herself: I feel good about myself because I know healthy diet is important to me, and I know it's gonna do good to my body
	Negative	Anticipation of negative outcomes of excessive drinking	Before physical activity: tired: before I get there I'm like kind of tired; I don't really want to go but I just do	Yes because some healthy foods are not 'fun': sometimes she [mother] puts mushroom soup sauce on it and I hate mushrooms, so like that's the not fun part, it eating ... the other not fun part is like; you kind of get tired of it, say carrots and stuff all the time, and salad. There's a million different salads you can have, but in the end they're all made of lettuce
Internal conflict	Cognitive dissonance	No: ...not really. I can't really say I do.	No	No: I still feel okay about it, like I do eat on a scale of one to ten of healthiness I'd put myself at about an eight...I don't think you should look different upon yourself just for eating an Oreo cookie or something
Researcher's comments		-Binge drinking is conceptualized differently -5 drinks as moderate: I guess it depends on how bad of a night I had. Like if I only had like five on the night, then in the morning I'm usually alright but if I drink a lot more than that	-Regularity turned it into 'natural': I'm at the point where I still go because I want to but it's almost like routine. I usually try to go at the same time everyday and stuff when I go, like almost like a job, it's – like I'm just so used to it now, I just do it because I always do it and I almost like, like – it almost feels weird not to go to the gym. Like on the days that I miss, I'm like – it's like missing a day of school sort of deal.	-it is conceptualized quite differently from physical activity in that fun and pleasure are not essential to be there: Diet's a little different, um…you know like they say, things that are good for you, don't taste good. The worse it is for you, the better it tastes. -Occasional fast foods are fine with eating healthy foods in general, because they are treats. Hence, no cognitive dissonance leading to internal conflict.

Social Context and Health Outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social context	Family	Wine drinkers at dinner: everybody in my family drinks and whatnot, and my parents are wine drinkers at dinner, and all the time	Consider physical activity to be important for healthy lifestyle: I have been taught that physical activity is important in maintaining a healthy life style. Concerns with weight: because of previous experience with extra weight	Healthy eating habits: ...my mom is a really good cook, like straight up ... that's why I can handle it, but once I move out, breakfast and lunch won't be a problem for me, but supper will be the big thing...
	Friends		Are hardly mentioned	Do not eat healthy: ... as far as health goes, they would probably be negative [influence].... I'm more likely to go out to like McDonald's or something with them than I am with my parents or go to the bar and have some drinks.
	Social norms	Part of socializing practice/social event: And at like special like family gatherings, pretty much everybody's having a drink	Body image relates to health: I definitely feel the media today is definitely pushing people to be skinny. Like, you can always tell just by looking at a person, like you know they take care of themselves.	Body image: ..like people who I guess you could say, eat like crap look like crap ... if I was obese it would be a self-esteem issue for me, um because ... people would be saying that about me and looking at me in that sort of way
Health Outcomes	Physical State		Positive: in shape, relaxed: I could say I feel relaxed after, that would be my main feeling really, because all that stress is off your body now from working out and now you're just uh like, 'Yeah…' Weight controller and energy booster: it's just always like a little booster	Good, energy booster: … it helps you in every way …with healthy diet ... it's what gets me going in the morning... gets my energy levels up, it's good for me
	PWB (psychological well-being)	Positive: Like it is fun, I'm not going to say it's not. When I go out with my friends, I have a good time. Let's you unwind, loosen up	Positive: feeling good and happy: ...mentally I'm high ...Um, I feel good about myself for doing it. It helps me feel better during [and] throughout the day.	Feeling good: I guess I could say I kind of feel good about myself because eating healthy makes you feel healthy.
	Social Well-being		Positive: when I go to the gym I enjoy – I enjoy just sitting there with people or even if I'm by myself, it doesn't bother me at all to go by myself or anything, just running on the treadmill watching TV, listening to music, you know, um, it's not bad going because I know pretty much everybody there…	
Researcher's comments			-significant others (friends and family) are hardly ever mentioned in relation to Colin's physical activity and reveal themselves to be of very minor influence in his picture of motivational pattern for physical activity	- The most important outcomes of healthy eating for Colin are that it helps control his weight and boosts his energy for everyday activities

Relational Matrices for Participant 3 (Colton)

Motivational Regulations for HB

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Are supported by social contexts	Are supported by social norms and incoming positive emotions	Are supported by social contexts of family and social norms
	Against	Are supported by the high cost of drinks		Are supported by friends

Autonomous motivations	For	Are supported by cognitions (occasional binge drinking and social drinking are fine)	Are supported by strong PHE, health attitudes, positive health outcomes and positive previous experience	Are supported by cognitions and positive experience of dealing with excessive weight
	Against	Are supported by cognitions against excessive drinking		
Intrinsic motivations	For	Are supported by positive incoming emotions	Are supported by regularity of physical activity and positive incoming emotions	Is supported by frequency of healthy eating and developing a habit of it
	Against			Are supported by positive emotions related to love for fast food and treats
Researcher's comments			- there are no motivational regulations working against engagement in physical activity	-The defining feature is that emotions, especially positive emotions, do not support any component of motivational regulations for healthy eating but they do have a lot to do with intrinsic motivation for fast food eating

Cognitions and Incoming Emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes		Are defined by family practices and negatively affected by frequency of alcohol drinking Support autonomous motivation for social drinking and against alcoholism	Are affected by social norms and positive previous experience Support autonomous motivation	Are defined by social norms Are supported by positive health outcomes Add to autonomous motivation for eating healthy
PHE (psychological health empowerment)	Self-control	Is nurtured by the family Has positive impact on PWB, supports positive emotions related to drinking Is negatively affected by excessive drinking: it does kind of lower your self-control 'cuz you're more willing to do stuff, like just kind of go with the flow with the people you're around.	Is supported by social norms and positive previous experience Supports autonomous motivation and adds to positive PWB	Is supported by eating practices (social norms) Is supported by positive outcomes Supports PWB Adds to autonomous motivation for healthy eating
Incoming emotions	Positive	Are created by feeling in control: it kind of makes me feel better about myself, you could say... Like to know I have self-control over that, I'm not going to waste a whole bunch of money or go out every weekend and get drunk like some people do that I know Supports intrinsic motivation Encourage social drinking: sometimes you are just in the mood...it's fun to go to the bar and drink Positive influence of 'happy feelings' on drinking	Are created by physical activity itself Add to the intrinsic motivation for physical activity	Are affected by eating practices (social norms) Support intrinsic component against healthy eating
	Negative	Encourage social drinking Discourage excessive drinking	Add to the controlled motivation for physical activity: Sometimes if I am feeling a little blue, I can go to the gym and it clears my head.	

Internal conflict	Cognitive dissonance			
Researcher's comments		-The influence of indirect peer pressure is downplayed by the participant.		-emotions, especially positive emotions, do not support any component of motivational regulations for healthy eating but they do have a lot to do with intrinsic motivation for fast food eating: I give myself a treat here and there... I enjoy a pizza from Pizza Hut and I don't feel bad about eating it ... never

Social Context and Health Outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social context	Family	Define and support PHE and patterns of engagement in alcohol drinking: it's the way I was brought up		Add to controlled motivation for eating healthy: I have a pretty darn good diet right now and ... mostly that's responsible for my mom because she does all the grocery shopping. And she makes like – she makes really smart choices
	Friends	Indirect support for controlled motivation for social and binge drinking		Support controlled motivation against: as far as health goes, they would probably be negative influence; I'm more likely to go out to like McDonald's or something with them
	Social norms	Define patterns of engagement in alcohol drinking: more with friends, less with strangers, going to the lake presupposes binge drinking	Encourage PHE and indirectly define the cognitions regarding the importance of physical activity	Affect health attitudes Add to controlled motivation for healthy eating and emotions
Health Outcomes	Physical State	Is positively affected by social drinking Is negatively affected by excessive drinking: hangovers are never fun. No one likes those... Low energy in the mornings	Benefits from regular physical activity: It keeps me in shape, keeps me healthy...and the people there is just a real energy booster at the gym Supports autonomous motivation	Benefits from long term energy sources: with healthy diet it just – um, like I – it's what gets me going in the morning, gets my energy levels up, it's good for me Supports cognitions
	PWB (psychological well-being)	Is positively affected by social drinking	Benefits from regular physical activity: It helps – you could almost say it cheers me up, makes me feel better, releases endorphins and stuff. All around I pretty much get a positive benefit out of going to the gym. and strong positive PHE Supports autonomous motivation	Benefits from regular healthy eating: it feels good to eat good. and strong positive PHE Supports cognitions
	Social Well-being	Is positively affected by social drinking: the good side is uh, I find it often like brings people together, you know you all go around, you socialize with people, it's a good way to meet new people, and like to get to know people better	Benefits from regular physical activity: and the people there is just a real energy booster at the gym Supports autonomous motivation	
Researcher's comments		Social norms are not quite in the picture - social well-being was mentioned even more often than physical health and psychological well-being - While alcohol drinking had admittedly positive implications for social well-being, the other two	The defining feature is that the outcomes (physical, psychological and social well-being) always feel positive, even when she feels sore -Health outcomes for physical activity and healthy eating are related	

		outcomes were described as mixed		

Other Influences

		Alcohol drinking	Physical activity	Healthy eating
External Factors	Cost	Adds to controlled motivation against: I'm not going to waste a whole bunch of money or go out every weekend and get drunk like some people do that I know... I don't live at the bar on the weekend or anything		
Previous experience			Adds to autonomous motivation: shortly after high school when I was working out of town we were eating lots of greasy foods 'cuz it was at a camp on an oil patch, and I put on a lot of weight real fast, and that kind of put the scare on me so after that I've been pretty good since then..	Adds to autonomous motivation for: shortly after high school when I was working out of town we were eating lots of greasy foods 'cuz it was at a camp on an oil patch, and I put on a lot of weight real fast, and that kind of put the scare on me so after that I've been pretty good since then..
Researcher's comments				

Self-regulation Mechanism

		Alcohol drinking	Physical activity	Healthy eating
Motivational regulations-emotions-cognitions interaction	In balance	Yes	Yes	Yes
	Not in balance			
Role of self-control	Planning	Yes for both social and binge drinking: ...I do plan on going out and drinking a little bit... if I'm going to be getting drunk or something, before I get too far I make sure I can get home		Yes, I do eat it [fast food] but I kind of limit myself to how much I'm going to have – I'm not going to eat ice cream seven days a week. Like I'll have something, maybe like a couple cookies two or three times a week ... like pop, maybe like a can a week, maybe, sometimes even less, depending on if it's in the house or not either
	Integration			
Cognitive split		Yes: occasional binge drinking is consistent with his notion of healthy lifestyle: I don't mind drinking in excess every once in awhile. I find it alright. Alcoholism is not: ...become like, addicted or an alcoholic sort of thing. That's a little extreme.		Yes: he conceptually differentiates between healthy food for health and junk food for occasional fun and treats and combines both of them in his diet: I do eat ...on a scale of one to ten of healthiness I'd put myself at about an eight... but I think if people should enjoy, say sugar, a sugar treat here and there, I don't think that's wrong at all and even if you are like the healthiest person in the world, I don't think you should look different upon yourself just for eating an

				Oreo cookie or something
Researcher's comments				Occasional fast foods are balanced out with eating healthy foods in general. Hence, no contradictions between motivations, cognitions and emotions.

Descriptive Matrices for Participant 4 (Danny)

Health behaviours (general information)

	Alcohol drinking	Physical activity	Healthy eating
Frequency	low in a typical month but currently higher (6-10 days a month): in the last thirty days, a lot went on… like I went into the depression which may rich out. But in typical month, like in average month, It's rare that I excessively consume on alcohol…	High (26-30 days a month): I play football for the D*** … Especially in the season. I am very active now, like I will spend about two to three hours a day doing regular physical activity. But, in season, I think it gets to the point where it's almost thirty hours a week, thirty to forty, so it's basically a full time job…	Moderate (16-20 days a month): I play football for the D***… so I do have to watch certain things… two things that I have to keep in mind … caloric intake…body weight…
Link to other health behaviours		Defines all other lifestyle choices: : I feel that, that football's my talent right now… my personal lifestyle habits have to be in line… to achieve that goal.	supports physical activity as sports requirements: It has to be there; otherwise, in times when I failed to keep a healthy diet, I really feel it when I am doing physical activity, you feel allergic, you feel sick, you feel everything in the way you don't feel good inside, you can't perform to your best outside, you need that stability.
Situation	Usually with team and friends (hanging out), currently coping with depression	With D*** football team, with friends in the gym, home alone	Home alone
Researcher's comments	The concept of drinking is split into excessive drinking (negative), social drinking (positive) and drinking for health (positive).		

Structure of motivational regulations for HB

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Yes for social drinking: You go if all the guys, like the everybody in the team and everything, you have free alcohol provided by somebody whatever, just the social thing to do… And I think when you get that level, like you get to engage, when you get to those functions, it just seems to be the norm Yes for excessive drinking: "… that's the only way that I could think about … because I won't do drugs. I did not want to do the whole counseling thing about time, and alcohol is the only thing that I have known to be there …	Yes, 'little': external pressure: little because … football which is an external pressure… it's my sport and I chase this for my coach. They set goals for me, as they want me to achieve … in certain metabolism in my physical fitness.	Yes, 'a little bit': external pressure: …we do have… a nutritionist and… everybody kind of keeps an eye on you… on the football team.
	Against	Yes for excessive drinking: May be that what seats my most standing on it now, the fact that I had bad experiences about it	No	No
Autonomous	For	Yes 'because it's	Yes 'because it's	Yes 'because it's

motivations		important' for social drinking: …it's important for me like I said to be social, and if that's the only option available, then, yeah, that's important. No for excessive drinking: …I don't think anybody should consider only to chose to drink. It's not healthy for you, like to excessively drink...	important': I have that like entirely because of this reason… because it is important for my sports… like my football and uh… my well being Yes to 'chosen and considered': yeah it's thoughtfully considered as a fully chosen I spent time planning what I'm going to do at the gym. And, everything.	important': … you do have like a standard, what you should eat, and such, I do believe that it's important especially for your workouts, for your sports, for your energy levels throughout the day, everything…
	Against	Yes, against excessive drinking: It's not healthy for you, like to excessively drink.	No	No
Intrinsic motivations	For	Yes for social drinking, has to do with fun and self-enhancement: Well, I enjoy what it is, I enjoy its taste. I think it's refreshing ...and it's fun to go and hang out with friends… Yes for excessive drinking, has to do with coping with the negative affect: …like avoid guilt that I placed on myself [after the break up with his girlfriend]… for that moment, it was to escape, like I could just put it off for a while ... I could just off the guilt, put off the pressure, and just avoid all the fingers pointing at me.	Yes: I love football. I can't say anything beside… I love football.	Yes: I do feel good about eating healthy.
	Against	No	No	Yes: Well, at the same time, I will… snack on bad stuff coz it tastes so good. …
Hierarchy of motivational regulations	Leading motivation for	Controlled: it's just like I said social norm when people are not pressuring you to do it, and you are going to a place where you know alcohol will be served, and something that it just seems to go hand in hand with the level of socializing you are doing, it does not seem like such a bad thing. Intrinsic: I enjoy what it is, I enjoy its taste. I think it's refreshing ...and it's fun Linked for social drinking	Autonomous: because it's important and thoughtfully considered and chosen But all motivations are interconnected: They interconnect because… like for me is really fun and I really do enjoy doing it. But I also at the same time know how important it is. And that… goes along thoughtfully considering fully chosen because I know how important it is… so I think about all angles what I could be doing with the three hours a day… and there's nothing else better.	Autonomous: because it's important: Now, now it's for me. Before then, it was… because of my caring mother…Well I think it's the most relevant because I do recognize its importance in my sport, in my well-being, and in my performance… across the length of school… and stay at home studying and healthy function throughout the day, and energy levels…
	Leading motivation against	Autonomous	No	Intrinsic
Dynamics of motivational regulations development		Controlled and intrinsic for social and excessive drinking: When I was about fifteen, sixteen, just discovering alcohol, it became almost a necessity to have fun, at a party, alcohol became necessity socialize and I would let in peer pressure in drinking. Controlled and autonomous against excessive drinking: That's just if you look at excessive drinking, just because of how damaging it is to your physical being. Particularly reach the stage of drunkenness, you destroy thing out but you do not recover… I am pretty sure its not good for you to get to that state, and it's a distraction as well. And its an illness that you can easily develop, its not like elbow is some other hereditary.	Intrinsic: …as a kid all it was fun and… the competitive drive made it pleasure. … was always playing football with friends, playing soccer with friends, playing street hockey, playing basement hockey, um… I leant football with my dad, …playing in-club sports that's always been my activities… Controlled and autonomous: … when you grew up and people start firing at you that you need to be active as about it as a day. …when you get more serious in sports … you realize … um, it is also important, and when you take a sport as seriously as I would take football, 'it is thoughtfully considered fully chosen'.	Controlled: … I think external pressures' when I was younger …coz my mom would be trying to get me to eat healthy all the time. Yup. Autonomous: …when it came to a necessity for football, for school, … for my size and my weight, everything… then it became very important.

		Autonomous for social drinking		
Researcher's comments		-Drinking for health does not seem to be in the picture for the participant when it comes to his motivations for alcohol drinking at the moment of the interview -Controlled motivations for both excessive and social drinking have nothing to do with direct external pressure: …when I think of external pressures, I think of things such as peer pressure … but I have never drunk because of other people's pressures, or other pressures around…";still, his motives are under the strong influence of the current socializing norms and the social coping norms endorsing excessive drinking for dealing with anxiety and depression.	-All the components of motivational structure are interconnected because they are in tune -Unlike with alcohol drinking, the motivational structure is clear cut	-Intrinsic motivations for and against are almost equally strong: it feels good when you do it, you do feel… a certain pleasure from doing that… but… yeah (laughed)… sometimes you don't want to and you need to choose otherwise. -The development of intrinsic motivations for healthy eating and against healthy eating were not commented on by the participant

Cognitions and Incoming Emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes	HB Concept	Excessive drinking as negative: …to the point where it's probably harmful on the liver, I mean walk is a straight-line that sort of the thing… Social drinking as positive Drinking for health as positive: …but I do believe that a certain amount of a day or a week is healthy… well, in 'Men's health', it says in terms of beer like two pines… one glass of wine a day or something like that…	Has to do with strength: … every play that I played in the game is physical … and so my strength is my strength. I hate sports that don't require strength. Like, I don't hate them but they frustrate me… Team sports and gym complement each other: …football and hockey always have been but eventually I part raise with hockey and now it's all football and … I often say that I have addiction to lifting weights…	Has to do with mental health, physical health and body image: …even, uh… somebody that isn't in any physical activity should be eating healthy. Uh, just because… it does… create a healthy function of the entire body like somebody that isn't eating healthy won't have the ability to concentrate … people who don't eat breakfast perform worse in school… people who don't eat healthy… will um, develop some body fat and body fat is going to diabetes…
	Influence on health	Aware of negative long-term effects: …in the long run the negative effects on physical health outweigh all the positive one when it comes to excessive drinking.	Always positive: All across the board it seems for good.	Always positive
PHE (psychological health empowerment)	Self-control	Very important: self-control to me is the true show case of strength Is understood as physical, mental and spiritual strength: It's just I think of a lack of self-control or a lack of spiritual-control, and lack of physical-control is becomes of your weakness. All of these things make me feel strong there as well.	Very important	Very important
	Sense of achievement	Sense of achievement: there is always achievements or lack of achievement that all defeats the way that I feel… how well I set to stay with the guidelines that I set before...	Sense of achievement: I feel like there's always an achievement that, I'm getting bigger, I'm getting stronger…	Sense of achievement: keeping healthy diet, definitely because … it helps me achieve a higher level.

Incoming Emotions	Positive	During excessive drinking: help avoid guilt: …at the time I felt like it was right…. I could just put off the guilt, put off the pressure, and just avoid all the fingers pointing at me. Before social drinking: excitement: Before, positive, because I am thinking I am in control and I know kind of everything that will go on and I will be able to control it. During social drinking: enjoyment, sociality: Then, during, It's fun, because I am at a party with my friends …I enjoy what it is, I enjoy its taste	Before: excitement: I'm not as excited as before… because I always want to set a personal best… During: fun	During and after: enjoyment: um… during, I love food and after, I still love food… I like to eat.
	Negative	Anticipation of negative outcomes of excessive drinking	No	
Internal conflict	Cognitive dissonance	Yes with excessive drinking: … if I drink it has no real good reasons. I don't think there is really a good reason to drink…, that's once again, keep in mind excessive drinking. when I look at other reasons as to why I do it, I think that I could take with everything a different route. Like I could go out socialize and could be a designate driver, and still have the respect, and I could have done counseling for the break up as suppose to, like I think there is always a healthier choice, and a better choice than drinking. Beside a healthy social drink. When you get to the point where you would be impaired to driving, where you would be damaging your body. I don't think there is any reason that should justify that.	No	No: I wouldn't call it an internal conflict, just no.. because… uh there's a lot of justifying if I were to design a diet…
Researcher's comments				

Social Context and Health Outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social context	Family	'Strong catholic home'	In childhood: …I learnt football with my dad	Family history: I don't have a good family history for disease… so…um… the more, the better to take care of myself, the less likely I am to… develop… um, certain diseases or disorders.
	Friends	Enjoy drinking: it's fun to go and hanging out with them… we all get rowdy on our own, and we feed alcohols to each other Some do drinking and driving: a friend died of that.	Do together: I go to the gym with… my friends and we almost like we'll compete, and we'll have fun while we're there.	
	Coach, doctor,		Guide and structure: They set goals for me, as to they want me re.. to	Guide and structure: you do have like a standard, what you should eat,

	nutritionist		achieve in certain metabolism in my physical fitness	and such, I do believe that it's important
	Social norms	Socializing practice: …its really weird. Because alcohols not needed… it just seems to go hand in hand with the level of socializing you are doing	A must for health: …people start firing at you that you need to be active	
Health Outcomes	Physical Health		Energy high: I'm full with energy…	Top physical shape: …it helped me performed my maximum abilities.
	PWB (psychological well-being)	Mixed: sometimes it's positive ... just depends. After excessive drinking: shame: … and then after, more overly negative, because after if you get caught in the heat of a party, you do something stupid, or you drink more than you wanted, you spend more than you wanted, or something like that.	Feeling good: I feel good doing it. I feel really good when I do it and I know that it's going to help me with the life that I've chosen, like with football and my personal well-being. After: happy: …and after really happy.	Feeling good: I feel good about it… it feels good to eat good… and it gives me more energy throughout the day.
	Social Well-being	Enhanced: I will drink some more … become a social thing.	Enhanced, team spirit: I've been helping my team by doing this…I… am … reaching … not at all personal goals but team goals, helping the team.	
Researcher's comments				

Relational Matrices for Participant 4 (Danny)

Motivational Regulations for HB

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Are supported by social norms for social drinking and excessive drinking	Are supported by coach and team direct and indirect influence	Are supported by family (mother), coach and team direct and indirect influence
	Against	Are supported by previous bad experience with excessive drinking, family catholic values and the cost of alcohol drinks		
Autonomous motivations	For	Are supported by positive social well-being outcomes	Are supported by strong health attitudes about 'all positive' influence on health and strong PHE	Are supported by strong health attitudes, PHE, positive health outcomes (top physical shape) and previous negative experience of skipping healthy eating
	Against	Are supported by strong negative attitudes towards excessive drinking and awareness of its negative impact on health		
Intrinsic motivations	For	Are supported by positive emotions experienced during drinking and social norms for	Are supported by positive emotions (before, during, and after) and friends who have the same lifestyle and whose company	Are supported by positive emotions (before, during, and after)

		coping with anxiety and depression	make it more fun	
	Against			Are supported by positive emotions (before, during, and after)
Researcher's comments				-Intrinsic motivation for healthy eating goes hand in hand with the intrinsic motivation for eating unhealthy because both are supported by positive emotions

Cognitions and Incoming Emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes		Are defined by family catholic values: … and maybe shaped from my family background as well. Because as raised from a strong catholic home, so the moral of the parents are passed down to the children… awareness of negative impact on physical health: you lose liver function, you actually become more prone to cancer, because its Vitamin A which fights cancer, everything around just either people lie about it or its not good for you. Are negatively affected by excessive drinking: …and it's a distraction as well, things such as your friends, and school become less important. So all of that can be taken away...	Are affected by social norms	Are affected by previous negative experience of skipping healthy eating
PHE (psychological health empowerment)	Self-control	Is negatively affected by the process of drinking: What I don't enjoy is the state of toxication, the state of less inhibitions …And I guess that it just has too harmful side effects and people don't control it well enough.	Is influenced by social norms	Is affected by previous negative experience of skipping healthy eating Helps sustain the regularity of healthy eating
Incoming Emotions	Positive	Are created by feeling in control; Drinking buzz during social and excessive drinking Encourage social drinking: … If I am feeling good inside… I can … have fun…	Are created by physical activity itself Add to the intrinsic motivation for physical activity	Add to the intrinsic motivation for and against healthy eating
	Negative	are aftereffects of excessive drinking Encourage excessive drinking: there is a hope that it would make it hurt less. Discourage social drinking: I know that when I am sad or depressed. Then I should not drink because regardless who am I with I would more than likely to be end up with that state.		

Internal conflict	Cognitive dissonance	Is created by the contradiction between motivational regulations (controlled and intrinsic for coping) and cognitions (health attitudes and PHE)		
Researcher's comments				

Social Context and Health Outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social context	Family	Define health attitudes and support PHE, indirect support for controlled motivation against excessive drinking		Used to define healthy eating habits Now indirect support for controlled motivation for eating healthy
	Friends	Indirect support for controlled motivation for social and excessive drinking Indirect support for controlled motivation against excessive drinking: definitely don't like drinking and driving, and a friend died of that.	Direct and indirect support for intrinsic motivation for physical activity	
	Coach, doctor, nutritionist		Add to controlled motivation	Add to controlled motivation
	Social norms	Indirectly encourage social drinking for socializing and excessive drinking as a coping strategy	Encourage physical activity, PHE and indirectly define the cognitions regarding the importance of physical activity	
Health Outcomes	Physical Health	Adds to autonomous motivation against excessive drinking	Benefits from regular physical activity and strong positive PHE	Benefits from long term energy sources: … I need those long term energy sources that isn't sugar, that isn't um… Found in those quick-to-eat meals it's in the vitamins and… a lot in the vegetables and fruits that I need, because when I have 3-4 hours of workout, um… that quick burst does me nothing.
	PWB (psychological well-being)		Benefits from regular physical activity and strong positive PHE Is positively affected by motivational regulations which are in tune: … I haven't had a reason to feel bad about it ...	Benefits from regular healthy eating: it feels good to eat good.

	Social Well-being	Adds to autonomous motivation for social drinking	Benefits from regular physical activity and strong positive PHE	
Researcher's comments				

Other Influences

		Alcohol drinking	Physical activity	Healthy eating
External Factors	Cost	Adds to controlled motivation against		
Previous Experience		Adds to controlled motivation against excessive drinking		Defines cognitions Supports autonomous motivation for healthy eating
Researcher's comments				

Rgulation Mechanism

		Alcohol drinking	Physical activity	Healthy eating
Motivations-emotions-cognitions interaction	In balance	Yes to social drinking	Yes	Yes
	Not in balance	Yes to excessive drinking		
Role of self-control	Planning	Yes: it's just about all the planning. Before I go, I kind of thinking my mind, know that what it's going to like, who is going to be there, and what do I want to do.	Yes: I spent time planning what I'm going to do at the gym. And, everything… I look to where I'll be next week.	Yes: …before eating will be planning a meal or preparing a meal, and trying to… keep in mind what I'm eating, how much protein, carbs and such I'll be taking in, and what they recommend, and what's recommended for my sport, for my training…I would, I would choose, um… some healthy food that I like, and I would eat a lot of those… And I would uh… choose the food that I kind of like, and eat some of them. And I'd choose some, like border-line healthy/unhealthy foods, and I would use them more than the completely unhealthy foods.
	Integration	Central, regulates and integrates all health behaviours: …like you can be physically strong, but it's more important for me to be hold a statically strong, like mind, body, and soul. To be physically active, to be mentally active always then to be spiritually active. So, it's like all areas of my life check out, then I think of truth, integrity, and true strength… Because then I feel all the decision I made, everybody that I meet, and everything that I say will be truly integral. Helps keep the balance: I like a sense of balance in everything … I	Central, regulates and integrates all health behaviours in relation to physical activity: …the things that I do that would damage… my… ability to do so [play football efficiently], I would look as lack of self control, like if I were to… um.. have an unhealthy diet, if I were to drink a lot, like, sort of the things like that is selfish choices… Helps keep the balance: … I won't be efficient in football, I won't… have time to balance my lifestyle if I don't have self control.	Central, regulates and integrates all health behaviours

		think that when you achieved a balance of mind, body, and soul, and all its internal and external. Then you don't need to reach out to other things to make you happy.		
Cognitive split		Yes: social drinking and drinking for health are congruent with healthy lifestyle		
Researcher's comments				

Descriptive Matrices for Participant 5 (Eva)

Health behaviours (general information)

	Smoking	Alcohol drinking	Physical activity	Healthy eating
Frequency	Very low (1-5 days a month): maybe like, I have had smoke once in a while, but may be one cigarette a month or something like that… just rarely. Never like more than one in a week.	Low (6-10 days a month): not like heavy drinking, you know, just like a glass of wine on supper … I go out on weekends with my friends and stuff such.	Moderate (11-15 days a month): ...I get the most activity at the gym	High (21-25 days a month)
Link to other health behaviours			Defines all other lifestyle choices Makes up for fast food and chocolate eating Physical activity and healthy eating against weight gain: I know that if I do eat unhealthy, and I stop going to the gym, then I will gain weight Sedentary lifestyle (less physical activity) is related to watching more TV and eating junk food	Is related to cooking healthy: ... cooking healthy ...I don't like to cook with lots of fat or thing like that, and staying active, I guess. Physical activity and healthy eating against weight gain: I know that if I do eat unhealthy, and I stop going to the gym, then I will gain weight
Situation	With friends: when we are together	Going out with friends: never drink alone or anything like that, like I never have a drink by myself	Mostly at the gym, team sport: More fun … so you won't do it on your own	Cooking her meals, dining out with friends
Researcher's comments	- she admits to smoking "once in while" but in the survey she chose "never smoke" and provided no data for motivational regulations for smoking. - she differentiates between smoking as an	-The concept of drinking is split into drinking as an addiction (negative when you drink in excess and alone) and social thing (positive).	-Physical activity is perceived as "one of the top things that you can do to keep yourself healthy" - She stresses the importance of turning it into routine and then habit	-Cooking healthy came up in the answer to the following question: Are there any other health related practices, which are important to you? - Eating healthy goes hand in hand with cooking healthy

	addiction and occasional smoking to get "the little cigarette buzz"			

Structure of motivational regulations for HB

		Smoking	Alcohol drinking	Physical activity	Healthy Dieting
Controlled motivations	For	Yes, "a little", indirect: my friends would never make me to feel pressure to have one, never… They would like me [to smoke], like once in a while, in a month.	Yes, "a little" to indirect external pressure: …if I am at the bar, let's say one of my friends buys me a shoot, then, I always have that, that's why I guess I put a little because of this reason … if someone knows that I am not drinking … and they buy me a drink, that is a way of pressuring someone to drink. Yes to get approval: everybody is like that there is a reason that you need to fit in, I think so.	Yes to friends' external pressure: I am kind of pressured by my friends, and I pressure my friends to go to the gym to just have somebody to go with…not a bad pressure, it's a good pressure. Yes to feel guilty: And if I don't go, I feel guilty. Because I know, that is good for me, I feel better after, so if I don't go I know I will feel guilty that I didn't go.	Yes to indirect external pressure: when I talk to my friends about, or my sister about something like somebody else cooked, you know, then I am always like… uh… that's sounds healthy maybe, maybe I will try it too, you know, so, it's just sharing a recipe between people something like that feel pressure to eat healthy or to cook healthier. Yes to feel guilty: I just feel guilty if I eat unhealthy, if I eat really fatty food or anything like that… Cooking something that s unhealthy when I know there is healthier ways to make it.
	Against	Yes for smoking as an addiction	Yes for heavy, addictive drinking		Yes for some friends' indirect influence: some people, you know they just make hamburger helper or something like that, because they are fast,
Autonomous motivations	For	No	No	Yes, very important: it is really important, for physical activity…I know that is really good for you … know these health benefits	Yes, very important: because it is important, I answered for completely, because of this reason.
	Against	Yes: smoking is not good for you ever, em.	Yes for heavy, addictive drinking		
Intrinsic motivations	For	Yes: fun: I enjoy it, like I enjoy it once in a while.	Yes: fun and tastes good: it's just something that I enjoy…I enjoy the taste or stuff like that, like I never order drinks that taste gross…	Yes: fun: I understand it's fun	Yes: fun to cook: because I love cooking, so, to find ways to make stuff more healthy is always fun to do.
	Against		Yes for heavy, addictive drinking	Yes: because of negative incoming emotions	Yes: unhealthy foods can taste better: ..whole-wheat flour, does not taste as good as the white flour…
Hierarchy of motivational regulations	Leading motivation for	Intrinsic: I don't really know why I enjoy it	Intrinsic: probably because this is fun and a really pleasure to do.	Autonomous: ... now the importance is more relevant to be.	Autonomous: I think because it is important …I will sacrifice a little bit of the flavor, for what's more healthy, so I think that's always being important to me.
	Leading motivation against	Autonomous	Autonomous: I just don't think I can be addicted to something, because I just feel I do have control of myself		Intrinsic: I don't think I would like to live my life without having chocolate or something like that
Dynamics of motivational regulations development		Intrinsic motivation has always been the leadings one	Controlled: I would always go grad party stuff like that… But other matters I really didn't drink at all. Intrinsic: while it just turn to 19 … so about a year I guess	Intrinsic: when I was little, it was just because it was fun, it is fun to play soccer, it is fun to play basketball, so when I was younger, its definitely because it is more fun Controlled and	Intrinsic and controlled, then autonomous: when I was younger, it's just the way I grow up, and I understand why stuff is healthier, now its important when I was younger its just the way that my mom cooked.

				autonomous: once I kind of began to understand the health benefits of exercising, that's when it became more important	
Researcher's comments		-It's difficult for her to explain intrinsic motivation, incoming emotions and PWB after: I don't really know why I enjoy it, because this is kind of hard to explain, because I feel the exact same before I feel the exact same after I have cigarette, so I don't really know why I enjoy it.		-External direct pressure of friends is perceived as a positive factor: not a bad pressure, it's a good pressure. -Feeling guilty as a positive motivator: I think the guilt makes it more into a positive thing, like if I feel guilty about not going then I will make sure that I will go next time, so the guilt end up with a positive thing.	-Eva perceived her feeling of guilt to be a positive factor. -An interesting comment about the power of sharing a recipe: it looks the recipe calls for it then, you know like I love cooking, so to I am always looking at recipes and I always make my very own recipes. -Motivations against healthy eating are rather motivations for eating unhealthy

Cognitions and Incoming Emotions

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Health attitudes	HB Concept	Addictive smoking as negative: I find that smokers just don't have control of themselves very much Occasional smoking as not very damaging and not making one a 'real smoker'	Addictive drinking as negative Social drinking as positive	Most important part of healthy lifestyle: one of the top things that you can do to keep yourself healthy Best as a habit: like something that I read once is that it takes 21days to build the habit. So if you take 7 days or 2weeks off that habit or something, so you have to go for 21days again to build the habit again. I think its not just for myself, I think its for everybody to build the habit. Social aspect: we can make a social thing like we all go to the gym together.	Very important: just through reading and everything, you know that 8-10 vegetables a day, like whole grains, and white flours, and stuff like that, you know. It's just always being on my mind There are always healthier choices: I mean you can always choose to cook whole-wheat pasta over white pasta, you can always choose to eat multi-grain bread over white-grain
	Influence on health	Aware of negative impact: smoking is not good for you ever…I have read so much about cancer and stuff like that… not a smart thing to do		Always positive: I know that's really good for you so … knowing these health benefit I don't think there is anything that is not good about it Long-term effect: people always straggle more things later in life, so If I can try to keep that down now, then, I know later I will be more healthy.	Always positive
PHE (psychological health empowerment)	Self-control	Very important: I don't have an addictive personality, so I m never scared to become addictive to it Feels in control: I feel like I am still in control of myself if … I just do it once in a while.	Strong and important: I just don't think I can be addicted to something, because I just feel I do have control of myself	Important: I just like being control of myself. If I don't go, I guess I feel less in control because I know I should be going.	Very important and linked with responsibility: there is nobody else can control my body, its only me that, I am dealing and making choices to keep healthier, so. I have to do everything I can to stay in healthy.I feel you are quite responsible for your body.
	Self-confidence			Increased: it's just always like a little booster and confidence, while you do it.	

	Sense of achievement			Yes: I guess I feel accomplished something for myself, something that I know is beneficial to me, yeah, I feel like I am achieved and accomplished something.	Yes: Because I like knowing that I am eating well, and then for some achievement that I always feel good about myself after,
Incoming Emotions	Positive	During: feeling good: At the time, probably more positive about myself, just because I enjoy it	Positive before: happy Then positive during: It's enjoyable	During: energetic: and then during, it's always, I just have all that energy, that I produce, and then I am using or everything.	Positive before cooking and during: love food
	Negative	During: dumb: I kind of feel dumb sometimes.	Negative before: bad mood Then negative during: grumpy	Before: reluctant: like I was always kind of have to strike myself there a little bit… I don't want to go to the gym, you know like I was always kind of have to strike myself there a little bit.	Before: not in the mood
Internal conflict	Cognitive dissonance	Yes: yes, for sure..I kind of feel dumb sometimes… useless, because there is no point to smoking I guess… not a smart thing to do, but I was always think that since I don't do it often that it won't affect me, but it always could.	No	No	No
Researcher's comments		-Self-control is included into the concepts of 'health' and 'being healthy': having self control does relate to healthy for me -Self-control is related to happiness: if you don't have control over every aspect of yourself, you won't … be happy -PHE is grounded in belief that "I don't have an addictive personality, so I m never scared to become addictive to it" --It's difficult for her to explain intrinsic motivation, incoming emotions and PWB after: I don't really know why I enjoy it, because this is kind of hard to explain, because I feel the exact same before I feel the exact same after I have cigarette, so I don't really know why I enjoy it.	-Self control is considered to be a protective factor against addiction _It seems that alcohol drinking kind of extends and intensifies the incoming feelings and emotions: positive become better, negative become worse		- Occasional junk food eating does not create any internal conflicts

Social Context and Health Outcomes

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Social Context	Family	Former addicted smokers: my parents used to smoke a lot, and then they quite, but after once a while they will have smoke or like a little cigar or something like that. And they can have a smoke once a while but never get addicted to it again, I guess. Family history: my	Regular wine drinkers: my parents are like drink lots of wine or stuff like that Family history of addictive drinking: two of my uncles are alcoholics	Think it very important: my mom always pushed me to go, like when I lived at home Family history: genetically we are not meant to be really thin people, I guess	Family is focused on eating and cooking healthy: like no one in my family is really thin or anything like that, so, it is always important for my mom to cook healthy because genetically we are not meant to be really thin people, I guess. So, cooking healthy is one way to keep ourselves healthy.

		grandma died because of cancer, so, well, but not lung cancer, its breast cancer. But still, just the idea of cancer can be linked to it. And that's just kind of scares me.			
	Friends	Occasional smokers: They would like me, like once in a while, in a month	Mixed: like some friends I go out dancing with more, so those friends are usually drink more than what I do with friends that we are going to a house party or something like that.	Physically active: if you have a friend or two that ask you to go to the gym, then that makes it a lot easier …	Mixed
	Social Norms		Endorse social drinking: "the bar thing": since everyone is surrounding you is drinking. So if you are not, it seems that you are not going to fit in or something like that.		
Health Outcomes	Physical State	Cigarette buzz: since I smoke rarely, I still feel the buzz… Energy drainer: I get more tired after I have one… it just makes me kind of drowsy		Weight controller: I m not really thin or anything like that, so, I have to do all that I can to stay healthy I guess. So it's important to exercise, because I know that will keep me more healthy. Energy booster: it's just always like a little booster	Good, energy booster
	PWB (psychological well-being)	Positive right after: positive about myself, just because I enjoy it it's just the buzz feels good Then negative: guilty: After, I feel guilty that's for sure …I am not smoking again for another month, so.	Mixed after: it's a mixed feeling really good or really bad if someone did something really stupid.	Positive: happy: And after, even if I may aching, but I always feel good about myself after ...I just always feel happy after	Positive: feeling good: I always feel good about myself after…I feel fine, because I don't think I would like to live my life without having chocolate or something like that, so that won't me feel worse about myself because I have some, because I know that I am eating healthy as well.
	Social Well-being	Positive: when we are together… it feels good …	Enhanced: it's bonding, I guess.. um it seems to bring friends together	Enhanced: it's just kind of social activity, it's just another way to be social, I guess.	
Researcher's comments		-It's difficult for her to explain intrinsic motivation, incoming emotions and PWB after: I don't really know why I enjoy it, because this is kind of hard to explain, because I feel the exact same before I feel the exact same after I have cigarette, so I don't really know why I enjoy it.		-Health and weight control are linked: people always struggle more later in life, so If I can try to keep that down now, then, I know later I will be more healthy.	-Eating healthy is linked to cooking healthy since her childhood.

Relational Matrices for Participant 5 (Eva)

Motivational Regulations for HB

		Smoking	Alcohol drinking	Physical activity	Healthy Dieting
Controlled motivations	For	Are supported indirectly by family and friends example	Are supported indirectly by friends and social norms	Are supported by all social contexts	Are supported by all social contexts, family history including
	Against	Are supported by family (parents) previous experience with	Are supported by family (parents) and high costs		Are supported by friends direct and indirect pressure

		heavy smoking			
Autonomous motivations	For			Are supported by cognitions and positive health outcomes	Are supported by strong health attitudes
	Against	Are supported by strong cognitions and negative PWB	Are supported by social norms against heavy drinking and health cognitions		
Intrinsic motivations	For	Are negatively affected by health attitudes regarding smoking Are under ambivalent influence of incoming emotions	Are supported by positive incoming emotions (before and during) social drinking: If I am at a happy mood, then maybe I will drink.	Are supported by positive incoming emotions before and during and friends' involvement: and … it is more fun to do with someone else more than do it by yourself.	Are supported by positive incoming emotions before and during and ability to cook
	Against		Are supported by negative incoming emotions (before and during): if I am at a bad mood, I won't, I would just being grumpy or something, I won't drink.	Are supported by negative incoming emotions before	Are supported by positive incoming emotions about unhealthy foods
Researcher's comments					

Cognitions and Incoming Emotions

			Alcohol drinking	Physical activity	Healthy eating
Health attitudes		Are negatively affected by smoking frequency Are negatively affected by positive incoming emotions Add to autonomous motivation against Thwart intrinsic motivation for	Support autonomous motivation against drinking in excess	Add to autonomous motivation for Support positive incoming emotions and fight negative feelings Are supported by positive health outcomes	Are defined by family upbringing Add to autonomous motivations for
PHE (psychological health empowerment)	Self-control	Is negatively affected by smoking frequency Is negatively affected by positive incoming emotions Is nurtured by family Positive influence on health outcomes and incoming emotions: you don't have control over every aspect of yourself, you won't be healthy, .. and happy	Supports autonomous motivation against drinking in excess: I just don't think I can be addicted to something, because I just feel I do have control of myself Positive influence on health outcomes and incoming emotions: you don't have control over every aspect of yourself, you won't be healthy, .. and happy	Adds to autonomous motivation for Supports positive incoming emotions: I just enjoy like the feeling of being in control of myself. Supports and is supported by positive health outcomes Is increased by the frequency of physical activity: when I do go, it just makes me feel like I do have more control	Support positive incoming emotions Support and is supported by positive health outcomes
Incoming Emotions	Positive	Are negatively affected by smoking frequency and cognitions against smoking Are supported by PHE Support intrinsic motivation for	Are supported by PHE Support intrinsic motivation for social drinking, intrinsic motivation against addictive drinking Define pattern of alcohol drinking (to drink)	Support intrinsic motivation for Encourage frequency of physical activity Are supported by cognitions and friends: … it is more fun to do with someone else more than do it by yourself.	Are supported by PHE Support intrinsic motivation for and against Encourage frequency of healthy and unhealthy eating

	Negative	Support intrinsic motivation for	Support intrinsic motivation against addictive drinking Define pattern of alcohol drinking (not to drink)	Support intrinsic motivation against Discourage frequency of physical activity Are fought by health attitudes	Encourage unhealthy eating: you know if I am…just, yeah, I guess a little bit to do with mood, but usually I cook healthy.
Internal conflict	Cognitive dissonance	Is created by the contradictions between motivational regulations, cognitions, incoming emotions: Because I know like I have read so much about cancer and stuff like that… not a smart thing to do, but I was always think that since I don't do it often that it won't effect me, but it always could.			
Researcher's comments				- Positive thing about feeling guilty for breaking the routine: I think the guilt makes it more into a positive thing, like if I feel guilty about not going then I will make sure that I will go next time, so the guilt end up with a positive thing. -Negative incoming emotions are decreased by turning the routine into a habit: it's harder to go, again the first time, and then after each time like once you feel that routine again, then it just becomes a habit. …like something that I read once is that it takes 21days to build the habit. So if you take 7 days or 2weeks off that habit or something, so you have to go for 21days again to build the habit again. I think its not just for myself, I think its for everybody to build the habit.	

Social Context and Health Outcomes

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Social Context	Family	Nurture PHE Support controlled motivation for occasional smoking and controlled motivation against heavy smoking: they can have a smoke once a while but never get addicted to it again, I guess. …I am kind of learned it from my parents Negative influence on smoking frequency	Support controlled motivation against addictive drinking	Support controlled motivation for	Support controlled motivation for and define health attitudes Especially her mother: she got me into enjoy cook
	Friends	Indirect for social smoking: my friends would never make me to feel pressure to have one,	Support controlled motivation for social drinking: like some friends I go out dancing with more, so those	Support controlled motivation for, intrinsic motivation	Support controlled motivation for and against healthy eating

		never.	friends are usually drink more	for and incoming positive emotions	
	Social norms		Support controlled motivation for social drinking and autonomous motivation against addictive drinking	Support controlled motivation for	
Health Outcomes	Physical State	Under mixed influence of smoking frequency Are supported by PHE	Under mixed influence of drinking pattern Are supported by PHE	Adds to autonomous motivation for, PHE, health attitudes Are supported by PHE	Is positively affected by the frequency of healthy eating Supports and is supported by PHE
	PWB (psychological well-being)	Under mixed influence of smoking frequency Are supported by PHE	Under mixed influence of drinking pattern Are supported by PHE	Adds to autonomous motivation for, PHE, health attitudes Are supported by PHE	Is positively affected by the frequency of healthy eating Supports and is supported by PHE
	Social Well-being	Under mixed influence of smoking frequency Are supported by PHE	Under mixed influence of drinking pattern Are supported by PHE	Adds to autonomous motivation for, PHE, health attitudes Are supported by PHE	
Researcher's comments				-She acknowledges the joint strong influence of the main aspects of her social context (family, friends and the established social norms for being fit and healthy)	

Other Influences

		Smoking	Alcohol drinking	Physical activity	Healthy eating
External Factors	Cost		Supports controlled motivation against: A waste of money. I know people who have gone to the bar and spent a hundred bucks at the bar and it's like why would you do that? I want to save money, and I will always drive, so I don't have to take cabs or anything like that…That way you can buy other things…		
Internal Factors	Ability to cook				Adds to intrinsic motivations for: I really enjoy cooking
Researcher's comments					

Self-regulation Mechanism

		Smoking	Alcohol drinking	Physical activity	Healthy eating
Motivational	In balance		Yes	Yes	Yes

regulations-emotions-cognitions interaction	Not in balance	Yes, but feeling of control helps reduce or eliminate the internal conflict			
Role of self-control	Planning	Yes: I feel like I am still in control of myself if I just do it once in a while. After I feel guilty …I am not smoking again for another month	Yes: before I go outside, I always decide do I want to drink or do I want to drive or do I just want to hanging out with my friends	Yes: I always kind of have to strike myself there a little bit. But I know I m going to enjoy it, so, I always make myself go	Yes: planning to eat in moderation: I think you should eat whatever you want to, just in moderation
	Integration	Central, regulates and integrates all health behaviours: I guess everything that healthy about me I do have control over, I do have control over the way I cook, I do have control over about smoke, and I do have control over of how much I drink, I do have control over how much I exercise, all of that, so I guess having self control does relate to healthy for me	Central, regulates and integrates all health behaviours: I guess everything that healthy about me I do have control over, I do have control over the way I cook, I do have control over about smoke, and I do have control over of how much I drink, I do have control over how much I exercise, all of that, so I guess having self control does relate to healthy for me	Central, regulates and integrates all health behaviours: I guess everything that healthy about me I do have control over, I do have control over the way I cook, I do have control over about smoke, and I do have control over of how much I drink, I do have control over how much I exercise, all of that, so I guess having self control does relate to healthy for me	Central, regulates and integrates all health behaviours: I guess everything that healthy about me I do have control over, I do have control over the way I cook, I do have control over about smoke, and I do have control over of how much I drink, I do have control over how much I exercise, all of that, so I guess having self control does relate to healthy for me
Cognitive split		Yes: occasional smoking does not make her a smoker, she feels that the description of a smoker does not fit her: I find that smokers just don't have control of themselves very much, and I don't never want feel like no control of my own body. I just never really want to be a smoker just because of that smell, almost, that smell just gross me out.	Yes: social drinking is congruent with healthy lifestyle	No	No
Researcher's comments		-Planning and integration go hand in hand - self-control is the key component in the self-regulation mechanism between all health behaviours		-Self-control plays a prominent role in integrating healthy eating with physical activity so that the latter would make up for Eva's love of chocolate and occasional fast food eating and would help her prevent weight gain successfully	-Self-control is very important in the self-regulation mechanism for healthy eating and is closely linked with the idea of moderation

Descriptive Matrices for Participant 6 (Faith)

Health behaviours (general information)

	Alcohol drinking	Physical activity	Healthy eating
Frequency	Low (6-10 days a month): it's usually on the weekends, mostly	Moderate (16-20 days a month): I try to get out lots and do. Because I live on campus, so the gym is right there, it's easy	High (21-25 days a month):
Link to other health behaviours		closely linked with eating healthy: it's at the top along with eating right	Linked to physical activity
Situation	With friends, on the weekends, when there's money	In the gym on campus, alone or with friends, team	

Researcher's comments		-Eating well and exercising regularly are the most important health-related practices -A kinesiology student	-Eating well and exercising regularly are the most important health-related practices -However, junk food is frequent too (11-15 days) because : It's easy to get junk food

Structure of motivational regulations for HB

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Yes "little" for indirect peer pressure: ...external factors aren't really big part... like I don't get persuaded to drink more than I want to... knowing your friends and they want drink, and you just casually drink with them… Influence of social norms: I guess I can have just as much fun if I am not drinking, so really, it's not a necessity, it's just what everyone else is doing	Yes, strong external pressure of social norms: external pressures, yeah, I definitely feel the media today is definitely pushing people to be skinny, and I find difficult sometimes. Seeking approval: I would say family members or the opposite sex, more, you know, if you were looking for someone like a boy friend or something, you want to look good	Yes for external pressure and guilt feeling: Because of external pressures, un…I was always taught by my parents to eat well, and, en…yeah, I mean external pressures ties with getting guilt, I mean I don't want to feel guilty because I am eating stuff that my parents wouldn't approve of it.
	Against	Yes: if I have the money to drink,.. depending on school, or getting exams, if I have exams, I won't drink alcohol. I will go social, but I don't drink		Yes: external factors: sometimes it's difficult to be healthy, sometimes it's really convenient to eat not healthy food.
Autonomous motivations	For	No: alcohol drinking is not important	Yes: important: I just think…a healthy lifestyle is important, being physically active… is part of the healthy lifestyle. Thoughtfully considered: I mean I do consider the factors of being physically active and not being physically active.	Yes: important and thoughtfully considered: I would put combined, just like I said from past year learning about nutrition and how important it is to have healthy diet, so, yeah, those two I would say would be more recently the past year for being important.
	Against			
Intrinsic motivations	For	Yes for social drinking: it's just for fun, yeah...the taste of it too	Yes: I feel that I am having fun when I am being physically active, and play sports...I found sports is absolutely fun…un… I love it competitiveness,	Yes: fun: because it's fun. I like to cook...I found cooking is really fun… so…um… yeah, I mean I think its fun to be able to cook healthy meals instead of getting fast food. pleasure: I enjoy the fact that you can eat healthy food and you can still have the food taste good and healthy.
	Against			
Hierarchy of motivational regulations	Leading motivation for	Intrinsic: because of fun, and that I put high... just for fun i guess, is the main factor	Intrinsic, but closely linked with autonomous: I am having fun which is important to me...probably the having fun part would be the most relevant.	Autonomous but linked with others: probably because its important .. I don't know If I put that they are all kind of...
	Leading motivation against			
Dynamics of motivational regulations development			Intrinsic: I have always wanted to because I thought that was fun. Controlled but not any longer: it's not so much anymore in my life, it was more when I was younger, so that definitely it's at the bottom of the list Autonomous: recently : ..that part mostly only happened in the last year me finding it is important. because I mean kinesiology have been leaning about exercise, healthy lifestyle, so, I learned that it is really important, and why it's important. So those two really ties more in the last year, more so	Controlled: that's how [eating healthy] I was brought up... it's just more that they were trying to teach me how to be healthy Intrinsic: I found cooking [healthy] is really fun…when I moved out on my own That became a fun part. Autonomous: recently: from past year learning about nutrition and how important it is to have healthy diet, so ... I would say would be more recently the past year for being important.

			than the fun has been thorough out my entire life	
Researcher's comments		-"fully chosen" definition of motivational regulation for alcohol drinking was not understood: considered fully chosen... um...can't implement very much for that... -Controlled (direct peer pressure) and autonomous motivations were rejected by the participant. Still, the interview reveals that fun has to do with socialising and hence, the influence of social norms (which is not felt as such by the participant) -It's not easy for the participant to describe her 'reasons' and explain why: I never thought it would be difficult, but it is.	-intrinsic and autonomous motivations feel as 'tied in': At the moment it seems to be tie up with also these two other reasons, yes, like thoughtfully considered and important - intrinsic motivation is still the leading one, but its dynamics develops towards autonomous component becoming more important: _the participant comments on fluctuations and dynamic nature of motivation: it's always changing the reasons… -She changes her mind about the score for autonomous motivation: I don't know I have it as …why I have it such a low	-Intrinsic motivation for healthy eating is different in that it has a cognitive aspect: pleasure from knowing that she's eating healthy

Cognitions and Incoming Emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes	HB Concept	Is good with "taking stress away": alcohol kind of helps sometimes Health and balance are closely related	An important part of healthy lifestyle for the participant and "life in balance". Differentiates between physical activity as a recreation and playing sports on teams (like for university or high school): ... it depends, if physical activity is just exercise, like going to the gym or playing sports. Is conceptualized as the way to deal with overweight: overweight is not healthy ...being overweight to me… like what I think of is being limited to what you can do, and stuff like that, and that bothers me because I love doing sports and I love being able to all types… Health is important, body image is secondary: as long as I am healthy, that's what matters to me.	Is important: I am at the stage in my life where need to have healthy diet, and need to be a nutritious person...I like to be seen as a person who is healthy Health and balance are closely related
	Influence on health		Positive, helps with weight problems	Positive: I know it's gonna do good to my body
PHE (psychological health empowerment)	Self-control	Is important: I like to be a little that I know what I am doing, and I am in control, and I am making the right choices Is linked to bigger concepts of independence and strength: ...wanting to be independent in self control... I like to feel like I did everything on my own, like, you know, I am paying for my own school, and I m doing everything, and I like the feeling of knowing that I am taking responsibility for my own life, and that is… it makes…makes me feel like I am a stronger person, makes me feel like		Is not a big factor: self control ties back into making healthy choices and decisions

		I am…like being able to take care of myself		
	Self-confidence	and confidence i would say, goes out	Yes: my confidence level goes up by feel better about myself.	
	Sense of achievement		Yes: that could be a big factor, I mean especially If I am just exercising by myself, I feel that I have achieved something good if I have exercised. So yeah, achievement is a big part of it.	Yes: I feel…um… responsible because I am making good choices
Incoming Emotions	Positive	During social drinking: enjoyment, energy, sociality: you get into a more…uplifting, a more hyperactive kind of mood maybe, more laughing	During physical activity: enjoyment, sociality: Having a good time, laughing with friends, you … yeah, I mean, being happy would be the main feeling I guess	Before and during: feeling good about herself: I feel good about myself because I know healthy diet is important to me, and I know it's gonna do good to my body
	Negative	Before social drinking: you get tired, and you start drinking…		Before: not feeling well, no caring for what to eat
Internal conflict	Cognitive dissonance	No	No	No: it's just a concern
Researcher's comments		-PHE is understood as mental health with the focus on self-confidence and self-efficacy and self-control -Overall, positive incoming emotions are strong: I would say positive...all the way	-PHE is understood as mental health with the focus on self-confidence and self-efficacy and self-control -Overweight means being limited in doing some types of sports	Healthy eating is linked with future goal to be a physic teacher and role model a healthy person: I wanted to say role model but I like to be seen as a person who is healthy and then you know maybe influence other people... well, especially younger people -PHE is understood as mental health with the focus on self-confidence and self-efficacy and self-control _Positive emotions have a cognitive aspect of pleasure from knowing to do an important thing _Self-control is linked with the sense of responsibility and sense of achievement

Social Context and Health Outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social Context	Family		Consider physical activity to be important for healthy lifestyle: I have been taught that physical activity is important in	Healthy eating habits: I was always taught by my parents to eat well

			maintaining a healthy life style. Concerns with weight: I have some family members that come out right and tell you if you gain weight then you should lose weight or something like that	
	Friends	Social drinkers: if they are really my friends, they won't push me to do	Are physically active: I try to have friends that like to play sports, like to be physically active, because I know then It helps me to be more physically active... it's a big factor, it helps a lot... it's overall attitude in the way… like they have the same ideals about physical activity I do then, it's easier for me to be active with them	Some eat healthy, some are not: the ones that I live with, they are pretty good about eating healthy, and which is good for me.
	Social norms	Part of socializing: I guess I can have just as much fun if I am not drinking, so really, it's not a necessity, it's just what everyone else is doing	Body image: I definitely feel the media today is definitely pushing people to be skinny, and I find difficult sometimes.	
	School			Kinesiology education, taking nutrition class: The education part of it would be the biggest
Health Outcomes	Physical Health	Mixed: energy levels fluctuate: I feel like get more energy while drinking, then you loss it if you drinking for a prolong time, you lose that energy, and that's usually when you stop drinking	Mixed: after exercise, you feel stimulitated ....the next day you get sour muscle	Positive
	PWB (psychological well-being)	Positive: relaxed and happy: the social atmosphere just makes you feel more outgoing, more relaxed… you are having a better time. Happy is basically a big one. Negative after drinking: "crash": what I don't like about it is the effect afterwards...you get really tired fast	Always positive: feeling good and happy: what I enjoy being physically active is the ways you feel after you do it... you feel really good about yourself.. feel happy Even when sore and tired: it's a good thing though. Like you know the tiredness is positive, because you know you are working hard.	Positive: feeling good and happy: I feel happy because I am healthy
	Social Well-being	Socialising as the most important outcome of drinking: relaxing... to be with friends... like kind of internal thing, like kind of…external, yeah... Um… the external part of it.. the social gathering, the socializing, with the people.. yeah, that would be more important.	Socialising: it's more fun when it's social gathering ...you don't only have the physical aspect, you also have the socializing aspect which I find very important being social and friends.	
Researcher's comments		-Mental well-being overlaps PWB -Happiness and health feel related: I feel it's healthy for you ... the less stress you have, the better you feel about yourself, and the more happy you are	-Health outcomes are always positive: I don't really know what would be negative about physical activities. -Physical, psychological and social outcomes are interconnected: you feel stimulated you feel really good about yourself, because you know you have done something that's gonna pertain, and benefit your body....you also have the socializing aspect -She stresses the important of friends: friends are persuasive, that way, you want to hanging out with friends, and you do what they want to do, there is a majority of them.	

Relational Matrices for Participant 6 (Faith)

Motivational Regulations for HB

		Alcohol drinking	Physical activity	Healthy eating
Controlled motivations	For	Are supported by indirect peer pressure and social norms for social drinking	Are supported by family, friends and indirect influence of social norms for body image	Are supported by family, and incoming emotions
	Against	Are supported by the cost of alcohol drinks	Are supported by school being a higher priority and claiming most of the time: I just have to study, and I don't have time, then I just try, you know, focus on what's important right now, like, priority is a big thing, so studying is a higher priority right now than going to the gym Negatively influence incoming emotions	Are supported by friends and external factors (easy availability and low cost of unhealthy food) Are thwarted by cognitions regarding unhealthy eating
Autonomous motivations	For		Are supported by strong cognitions (health attitudes and PHE)	Are supported by cognitions and school education
	Against			
Intrinsic motivations	For	Are supported by positive emotions experienced during drinking	Are shared by friends and supported by positive emotions experienced during physical activity	Are supported by ability to cook and positive incoming emotions
	Against	Are supported by negative emotions experienced during drinking		
Researcher's comments		-The influence of indirect peer pressure is downplayed by the participant.		-Controlled motivation against healthy eating are rather controlled motivations for unhealthy eating

Cognitions and Incoming Emotions

		Alcohol drinking	Physical activity	Healthy eating
Health attitudes		Are negatively affected by excessive drinking	Are supported by positive outcomes Add to autonomous motivation for physical activity	Are supported by positive health outcomes and school education (nutrition classes) Add to autonomous motivation for healthy eating Thwart controlled motivation against healthy eating: it could become a habit which I don't want it to happen...because the health thoughts that I have learned Support positive incoming emotions
PHE (psychological health empowerment)	Self-control	Is negatively affected by the process of drinking: … you lose perspectives of judgement, judgement is the big one, because you say the things you do, that you wouldn't normally do if you weren't drinking. Same as self-control is one of part of that.	Is supported by family and positive health outcomes: my confidence level goes up by feel better about myself.	Is supported by family, school, positive health outcomes and ability to cook Add to autonomous motivation for healthy eating Thwart controlled motivation against healthy eating Support positive incoming

				emotions
Incoming Emotions	Positive	Are created by feeling in control Encourage social drinking: sometimes you are just in the mood...it's fun to go to the bar and drink Positive influence of 'happy feelings' during drinking on all health outcomes: I feel it's healthy for you	Are negatively influenced by existing social norms on body image and controlled motivation against physical activity Are supported by frequency of engagement and positive health outcomes Positive influence on all health outcomes Add to intrinsic motivation for Define type of physical activity: with friends, team: And if I am already in a good mood, then I will go play sports by the people…	Are supported by cognitions, love for cooking and positive health outcomes Support controlled and intrinsic components for healthy eating Encourage healthy eating habits Add to positive health outcomes
	Negative	Encourage social drinking Discourage excessive drinking	Define type of physical activity: individually: If I am exercising individually, it could be a more of a stressful reliever, just maybe I had a bad exam or I don't want to study, because I am feeling stressed, so then I would just go by myself, you know, exercise out, and then, for being with friends, I don't really going and doing sports with friends when I am stressed, I feel that it's easier to relieve the stress when I am by myself.	Disrupt healthy eating routine: can lead to unhealthy choices: the way I am feeling, can definitely like sometimes if you are not feeling good, you don't care about what you eat, so…you might not make healthy choices. Negatively affect health outcomes
Internal conflict	Cognitive dissonance			
Researcher's comments				-Reciprocal relationships between incoming emotions and health outcomes

Social Context and Health Outcomes

		Alcohol drinking	Physical activity	Healthy eating
Social Context	Family	Define and support PHE: it's the way I was brought up, I mean, I was totally… I was taught you know, you do things by yourself, you don't ask help from other people, and it's important to me to do stuff on my own, make my own choices, and feel good about it.	Define and support PHE Add to controlled motivation for	Define and support PHE Add to controlled motivation for
	Friends	Indirect support for controlled motivation for social and excessive drinking	Add to controlled and intrinsic motivations for: Are a big factor... I think it would be more difficult for me to be physically active. If I did not have friends that were physically active	Add to controlled motivation against: the people that you are hanging out ...if you are with people that want to eat junk food all the time, you are more likely too.
	Social	Indirectly encourage social	Add to controlled	

	norms	drinking for socializing	motivation for Create negative incoming emotions before physical activity:	
	School		Adds to controlled motivation against	Adds to autonomous motivation for and supports cognitions regarding healthy eating
Health Outcomes	Physical Health	Is positively affected by social drinking and positive incoming emotions	Is positively affected by frequent physical activity, positive incoming emotions and cognitions	Is positively affected by healthy eating habits, and positive incoming emotions Supports cognitions
	PWB (psychological well-being)	Is positively affected by social drinking and positive incoming emotions	Is positively affected by frequent physical activity, positive incoming emotions and cognitions	Is positively affected by healthy eating habits, and positive incoming emotions Supports cognitions
	Social Well-being	Is positively affected by social drinking and positive incoming emotions	Is positively affected by frequent physical activity, positive incoming emotions and cognitions	
Researcher's comments				

Other Influences

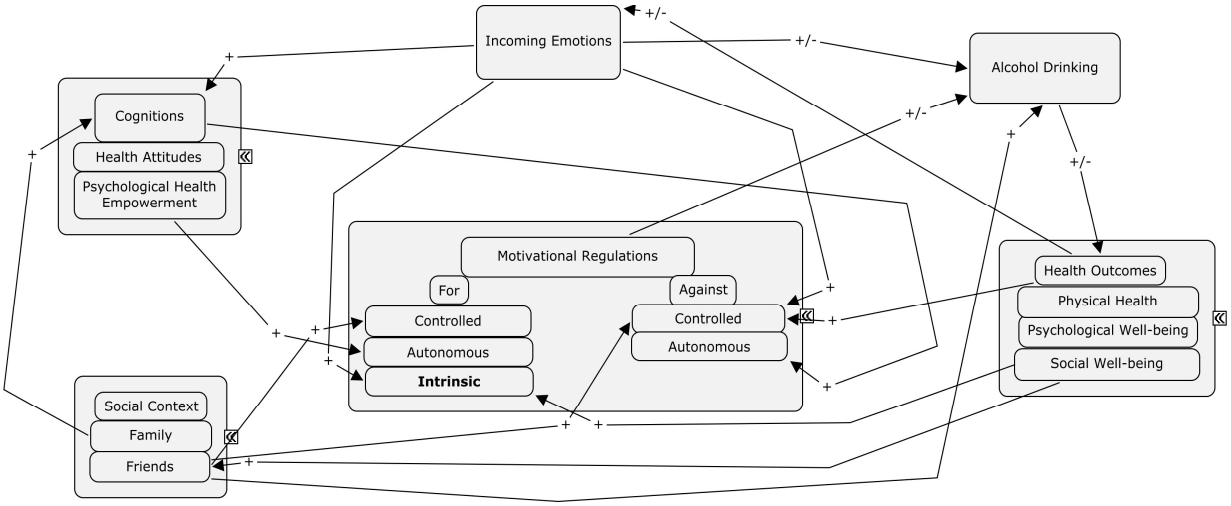
		Alcohol drinking	Physical activity	Healthy eating
External Factors	Cost	Add to controlled motivation against		Add to controlled motivation against
	Availability			Add to controlled motivation against: sometimes it's difficult to be healthy, sometimes it's really convenient to eat not healthy food ...it's easy to grab something that's not healthy but is there for you
Internal Factors	Ability to cook			Supports intrinsic motivation for healthy eating, PHE and adds to positive incoming emotions: I am a fan of cooking
Researcher's comments				

Self-regulation Mechanism

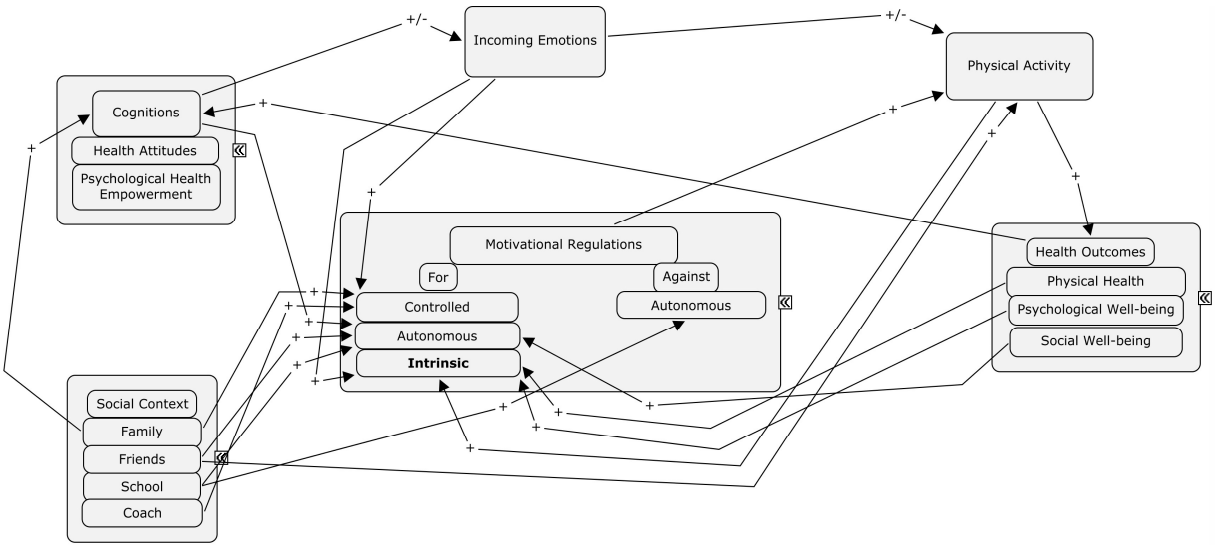
		Alcohol drinking	Physical activity	Healthy eating
Motivational regulations-emotions-cognitions interaction	In balance	Yes Supports PHE: The balance definitely helps with self-confidence. Define patterns of drinking	Yes Supports PHE: The balance definitely helps with self-confidence.	Yes Supports PHE: The balance definitely helps with self-confidence.

	Not in balance			
Role of self-control	Planning	Yes: kind of you have to weigh it out I guess.. I don't push myself that far while I am drinking		Yes, very little: I would say self control ties back into making healthy choices and decisions, so…that I don't find that a big factor…
	Integration	Yes: responsibly integrate onto lifestyle as casual drinking: I like the feeling of knowing that I am taking responsibility for my own life		
Cognitive split				
Researcher's comments		-Health and balance are closely related in the participant's perception. -Balance and self-control are linked to be ability to take care of herself, be independent and strong -It's not easy for the participant to describe her 'reasons' and explain why: I never thought it would be difficult, but it is.	- Motivational regulations tie in with each other fine if they give rise to no contradictions in cognitions and emotions -No need for exercising self-control. Self-confidence is more relevant than self-control in the context of physical activity	-Since intrinsic component is present, does not require lots of self-control exercising:

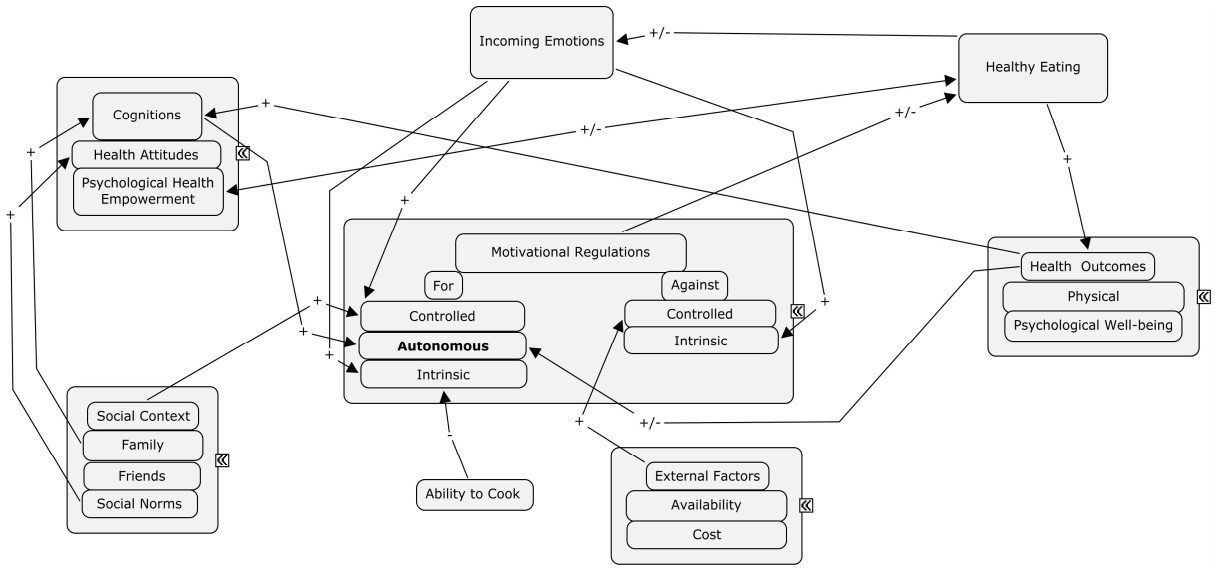
APPENDIX K
WITHIN-CASE DISPLAYS



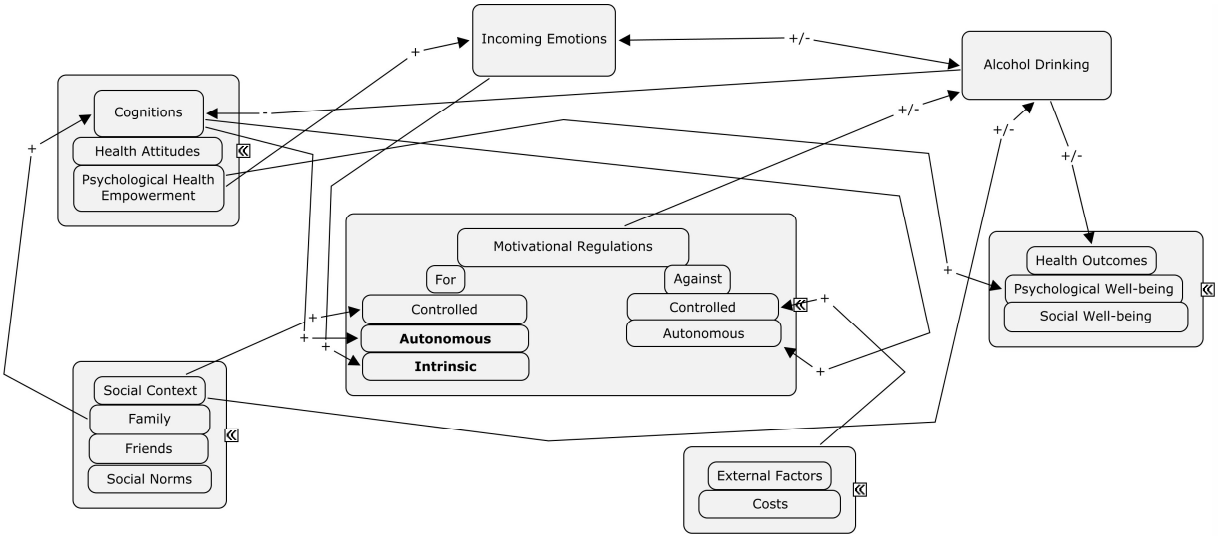
A display of perceived causal relations of alcohol drinking in Participant 1 (female, 18-year-old, a low-risk social drinker)



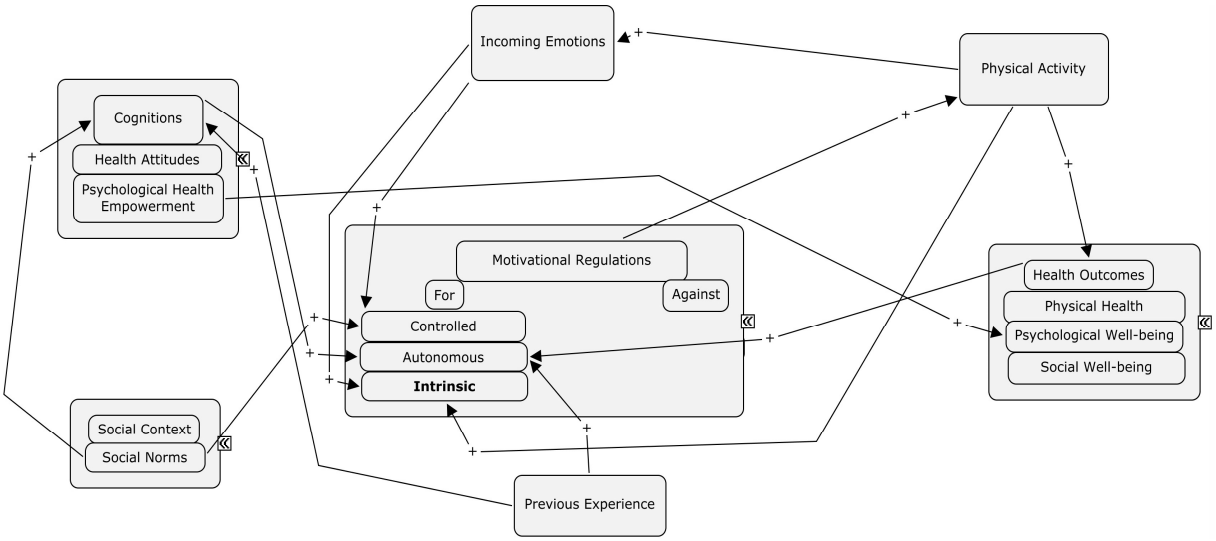
A display of perceived causal relations of physical activity in Participant 1 (female, 18-year-old, moderately physically active)



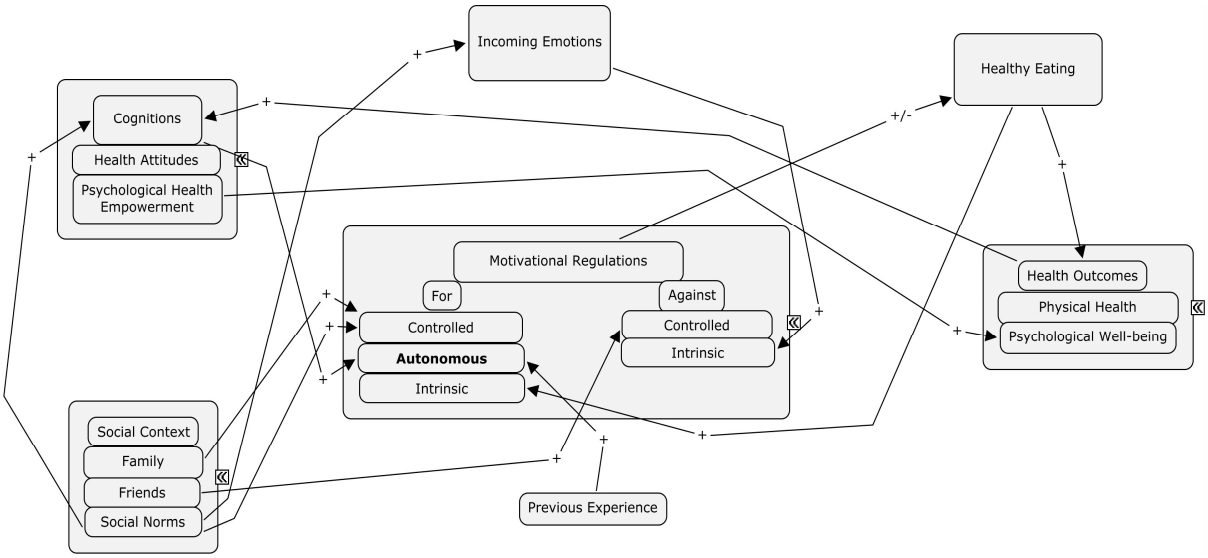
A display of perceived causal relations of healthy eating in Participant 1(female, 18-year-old, low on healthy eating)



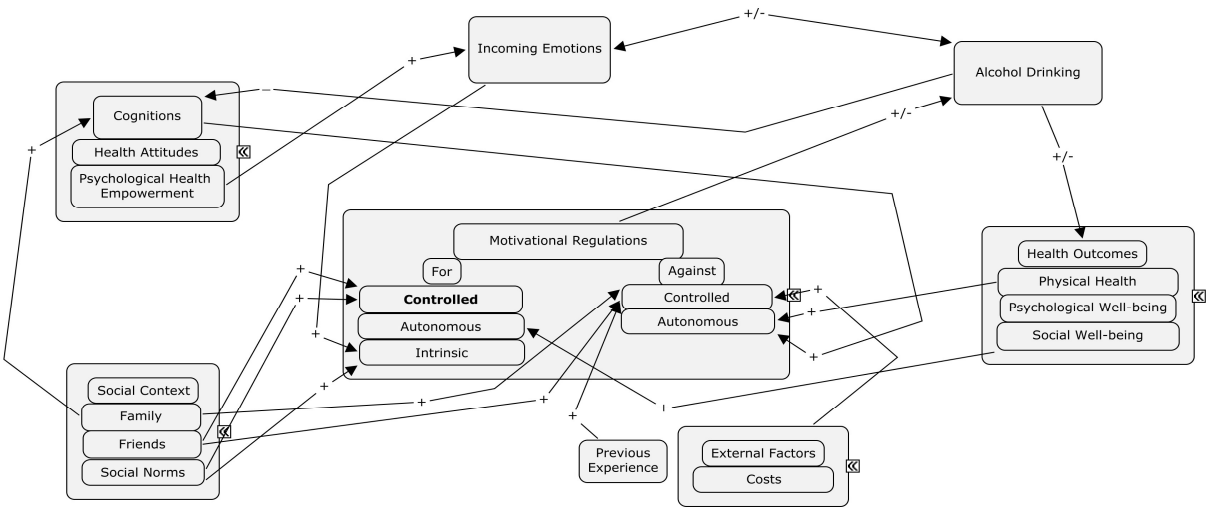
A display of perceived causal relations of alcohol drinking in Participant 3 (male, 22-year-old, a low-risk drinker with 1-2 days of binge drinking)



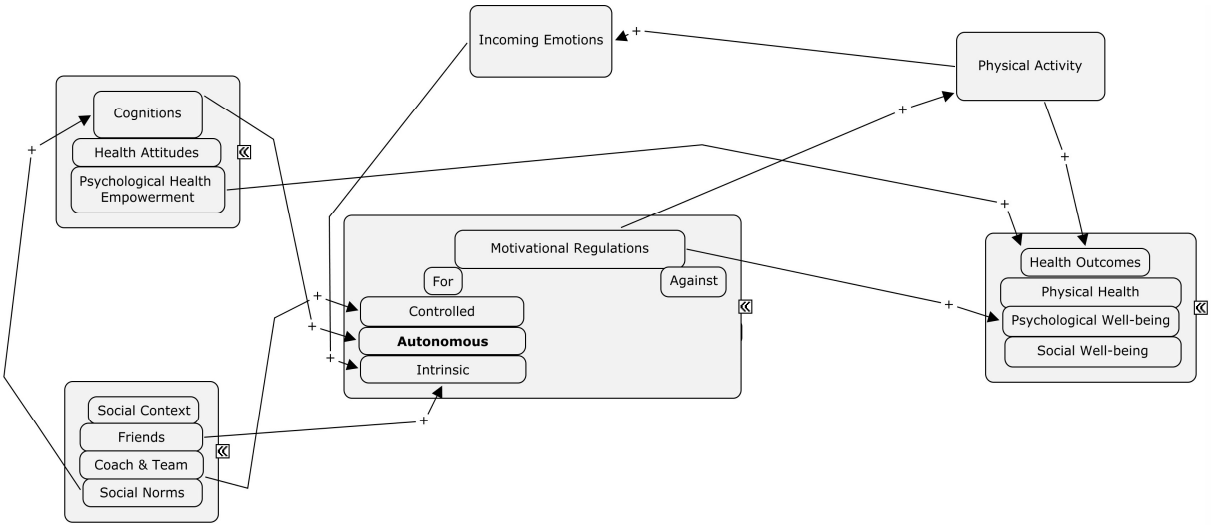
A display of perceived causal relations of physical activity in Participant 3 (male, 22-year-old, moderately physically active)



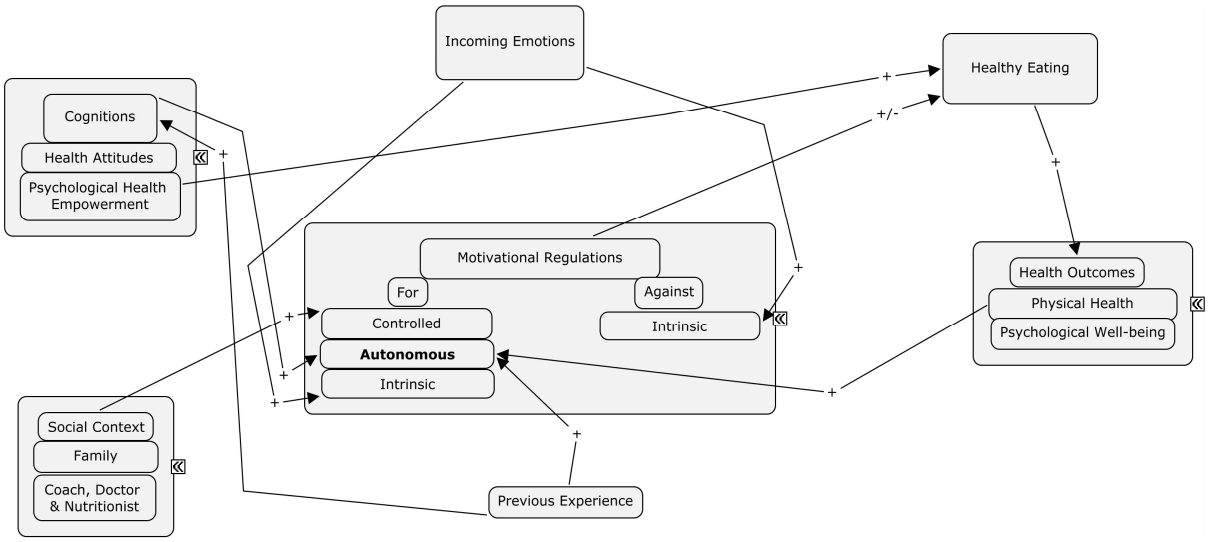
A display of perceived causal relations of healthy eating in Participant 3 (male, 22-year-old, high on healthy eating)



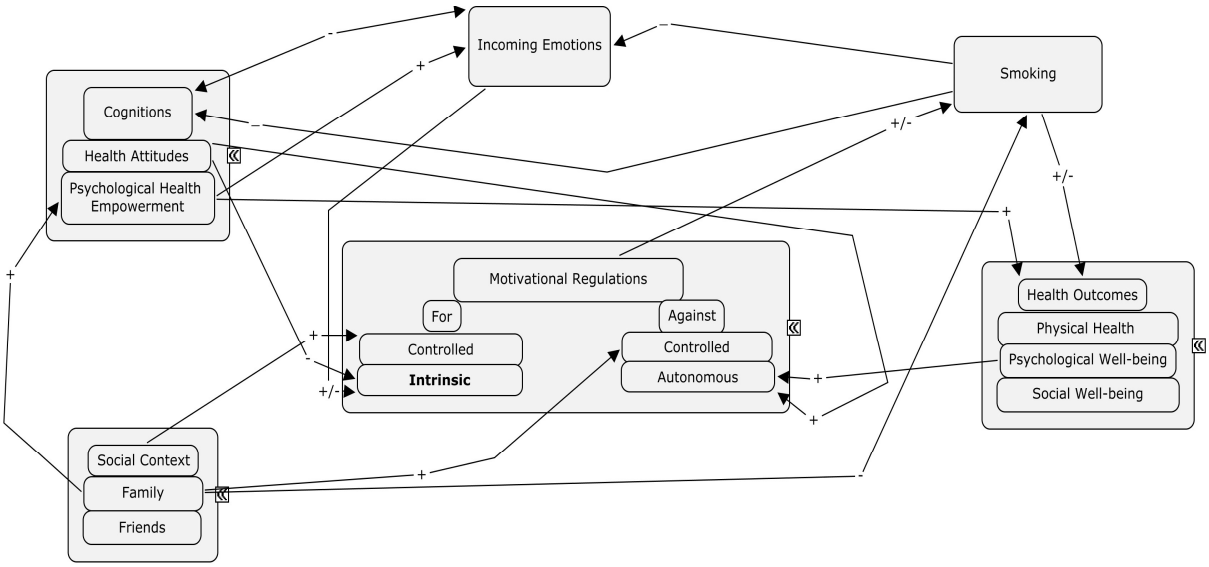
A display of perceived causal relations of alcohol drinking in Participant 4 (male, 20-year-old, a low-risk drinker with occasional binge drinking)



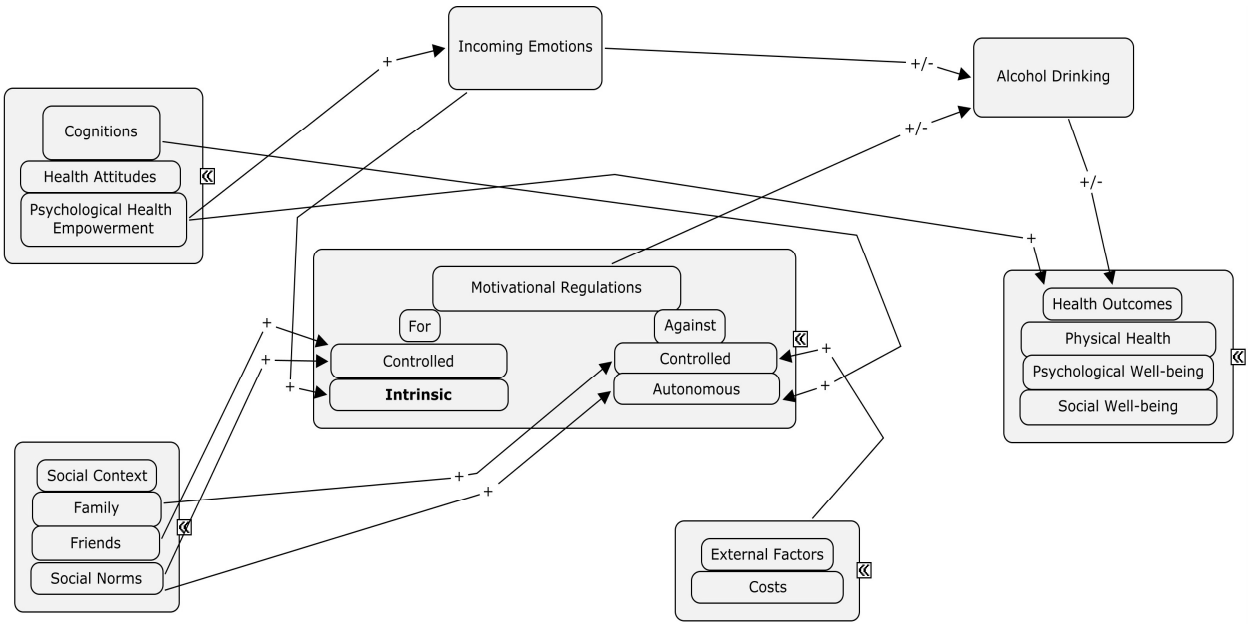
A display of perceived causal relations of physical activity in Participant 4 (male, 20-year-old, highly physically active)



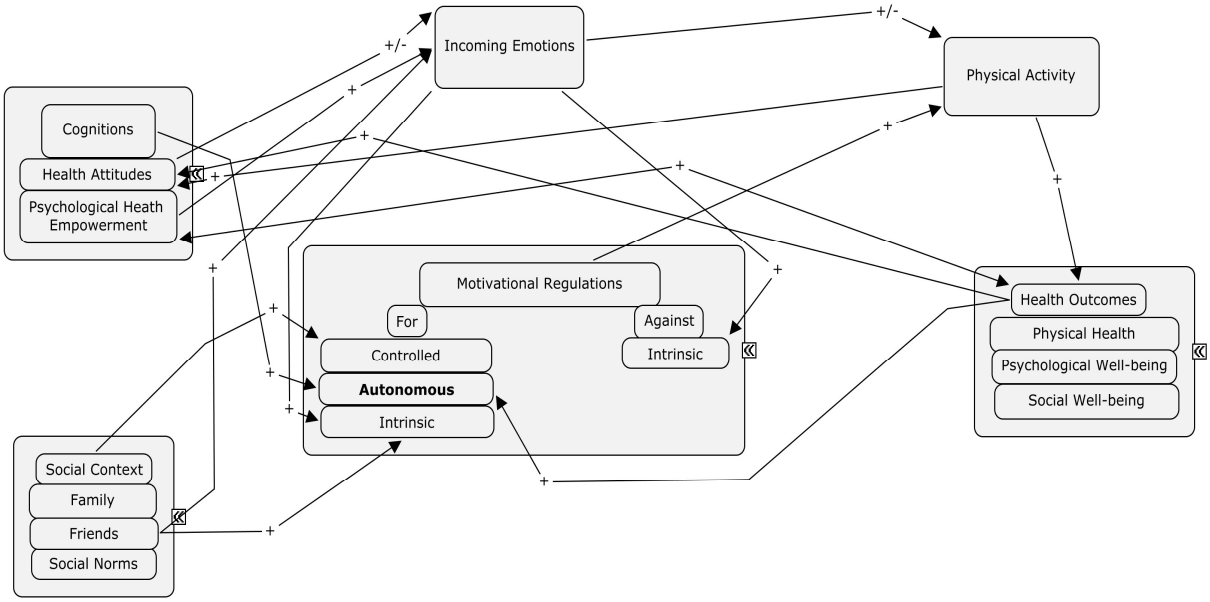
A display of perceived causal relations of healthy eating in Participant 4 (male, 20-year-old, moderate on healthy eating)



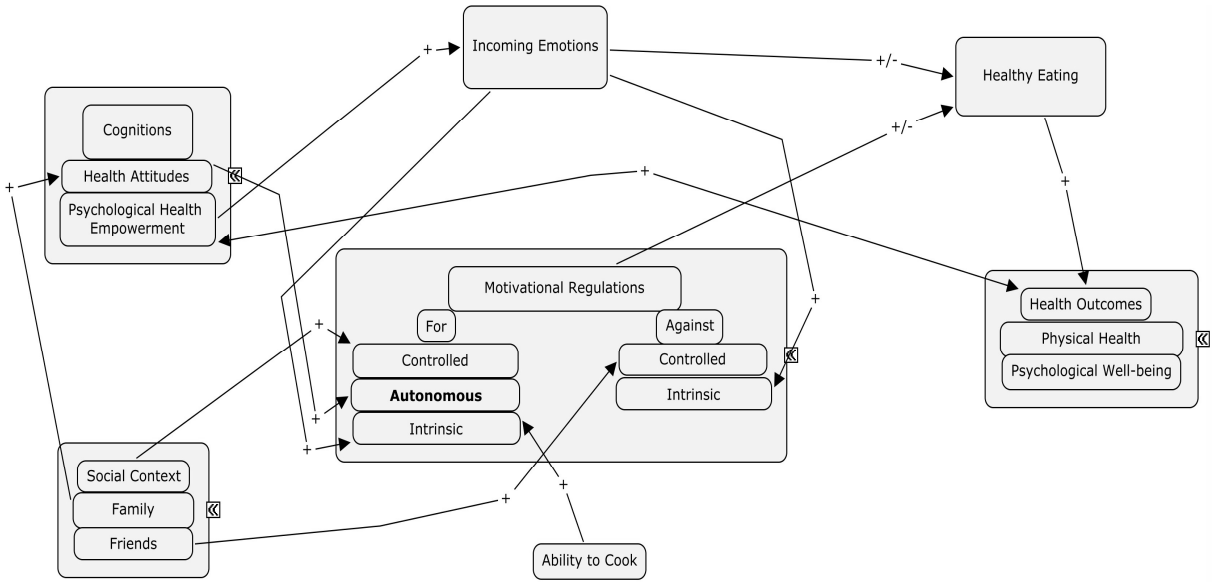
A display of perceived causal relations smoking in Participant 5 (female, 19-year-old, an occasional light smoker)



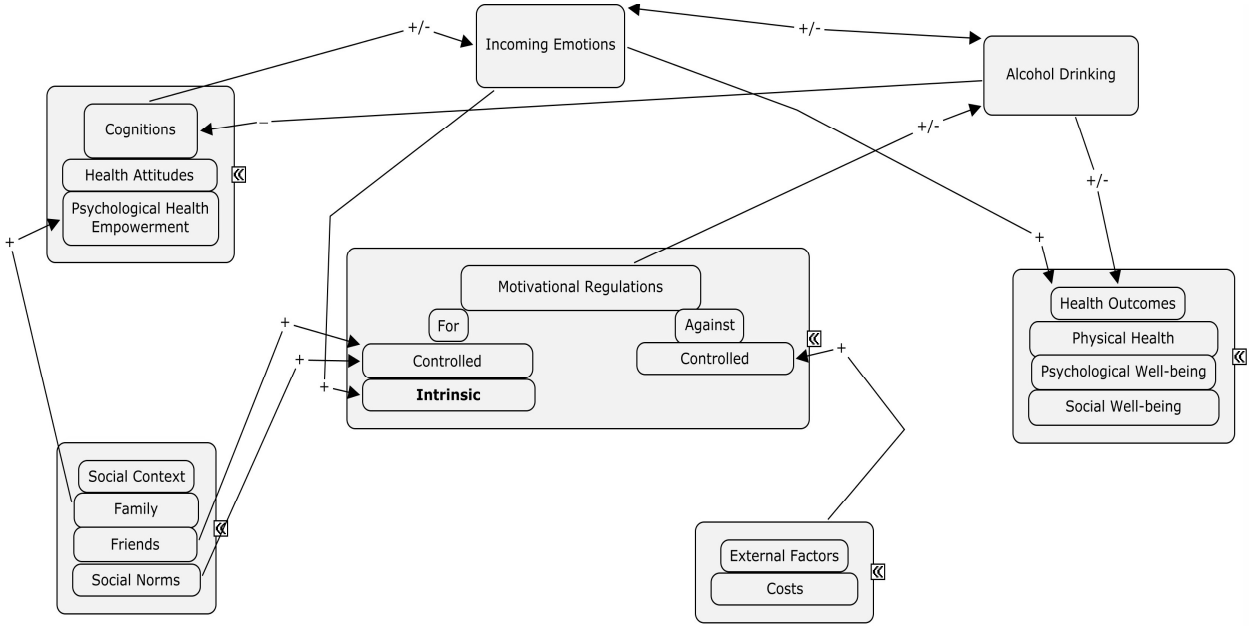
A display of perceived causal relations of alcohol drinking in Participant 5 (female, 19-year-old, a low-risk drinker with occasional binge drinking)



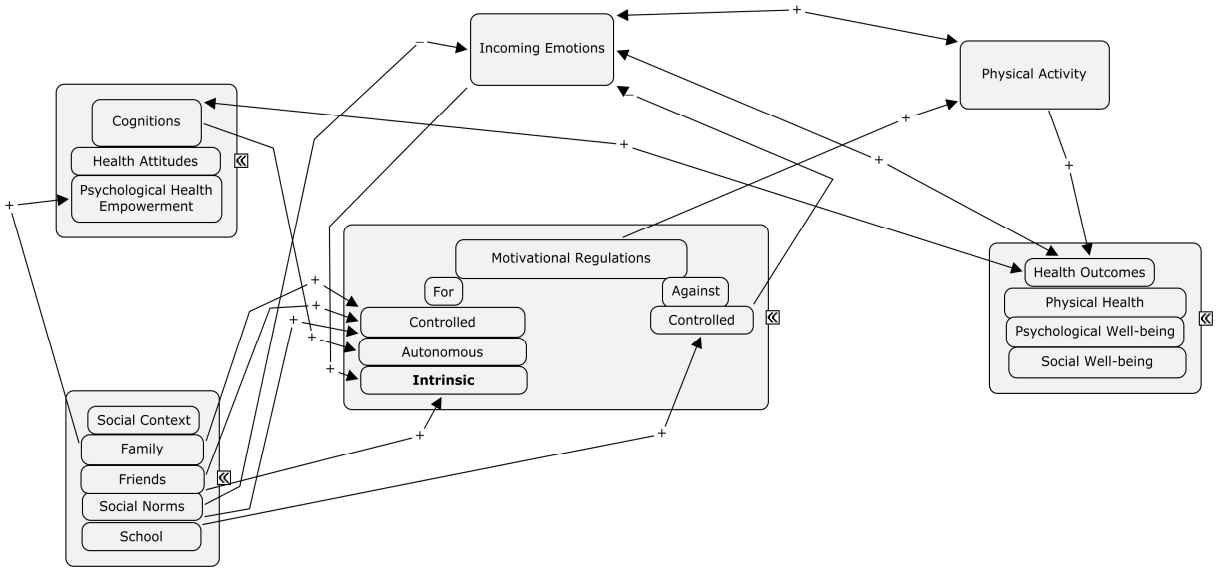
A display of perceived causal relations of physical activity in Participant 5 (female, 19-year-old, moderately physically active)



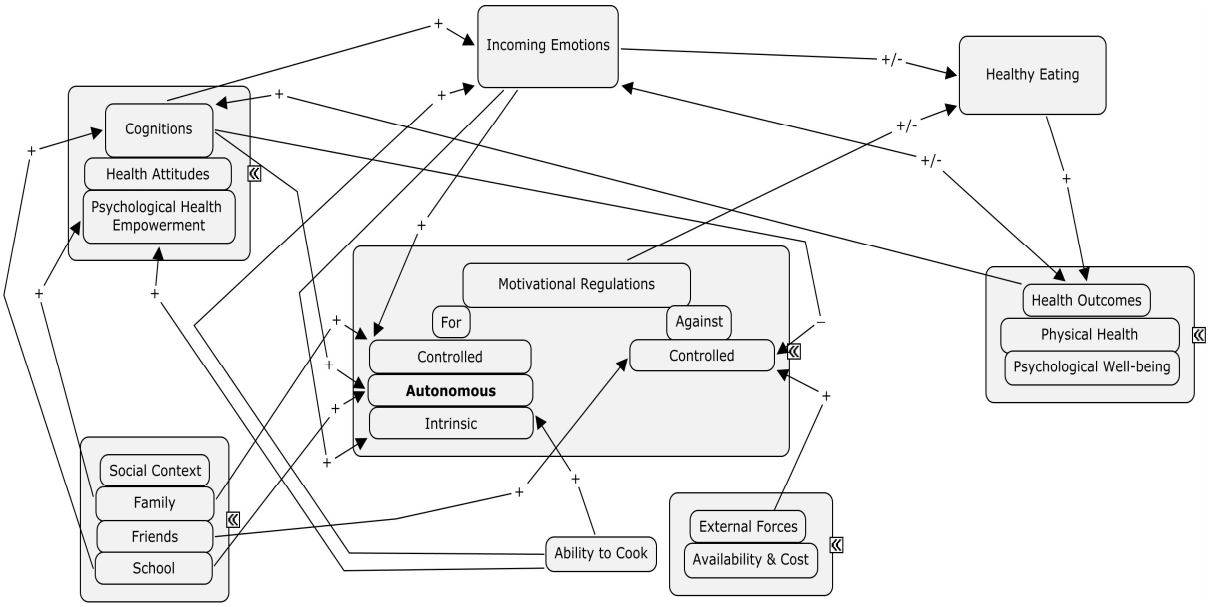
A display of perceived causal relations of healthy eating in Participant 5 (female, 19-year-old, high on healthy eating)



A display of perceived causal relations of alcohol drinking in Participant 6 (female, 19-year-old, a low-risk drinker with occasional binge drinking)



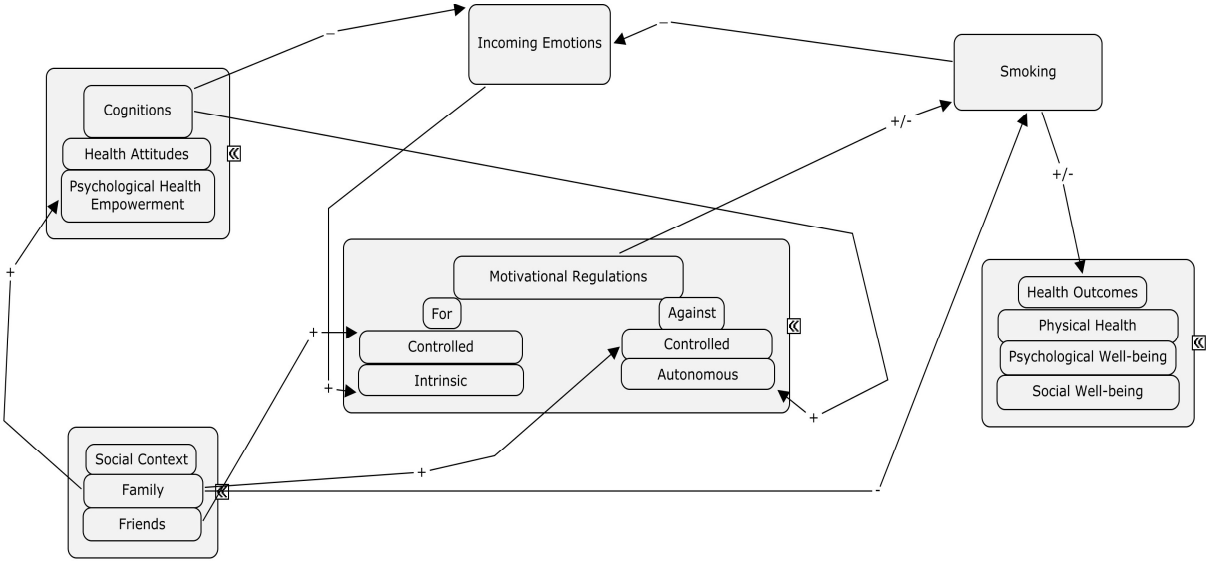
A display of perceived causal relations of physical activity in Participant 6 (female, 19-year-old, moderately physically active)



A display of perceived causal relations of healthy eating in Participant 6 (female, 19-year-old, high on healthy eating)

APPENDIX L
BETWEEN-CASE DISPLAYS

Individual displays for the same behaviour were matched pairwise and the percentage of their match in terms of concepts and relations (direction of influence) was calculated; the thickness of the line reflected the frequency of the relation from 1 point (when there was a match between two displays) to 5 points (when all six displays matched). Matches in terms of concepts were invariably higher than the matches between the relationships because most of the concepts were theory-drive and preconceptualized before the study and the relationships were not.



A between-case display for smoking (n=2). The matching rate between displays was 82-100% for the concepts and 50-61% for the relations among them.

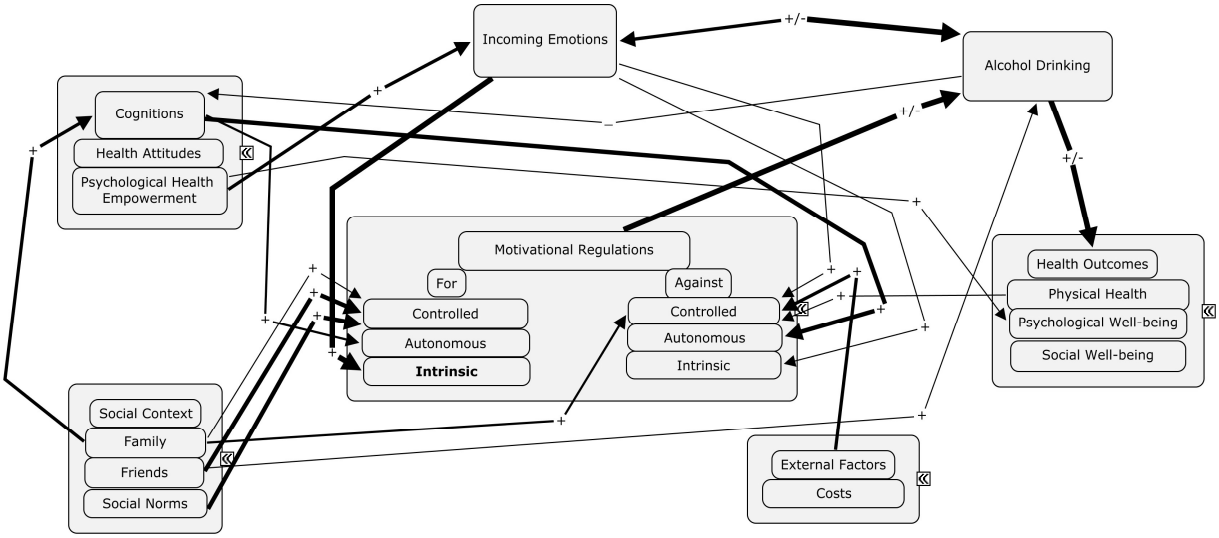


Figure 7-28. A between-case display for alcohol drinking (n=6). The matching rate between displays ranged 80 to 100% for the concepts and 25 to 82% for the relations among them.

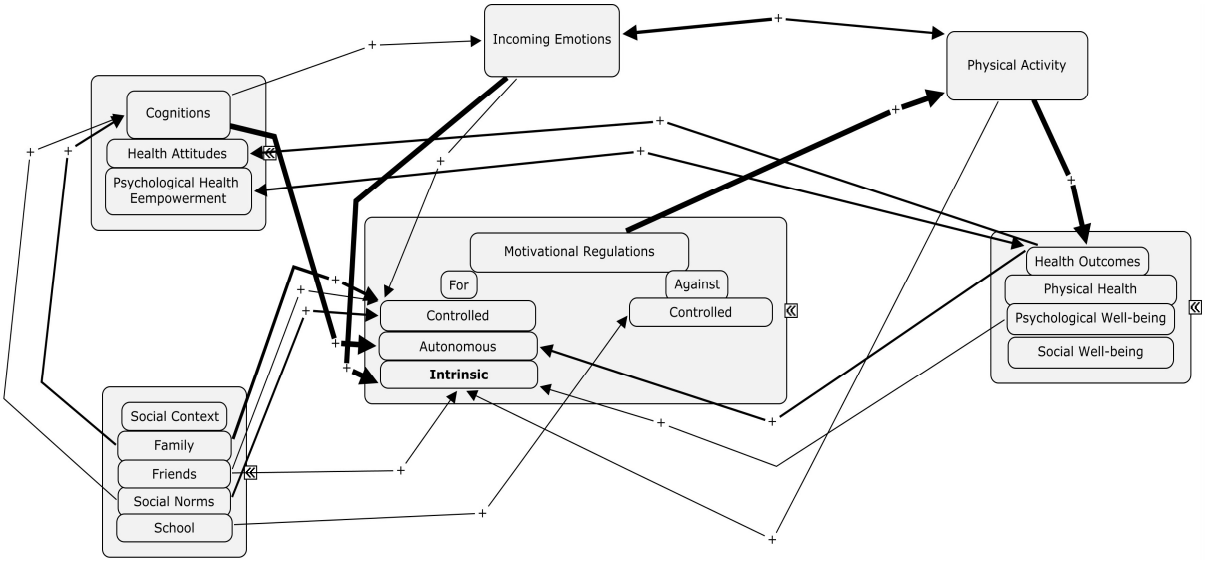


Figure 7-29. A between-case display for physical activity (n=6). The matching rate between displays ranged 83 to 100% for the concepts and 22 to 73% for the relations among them.

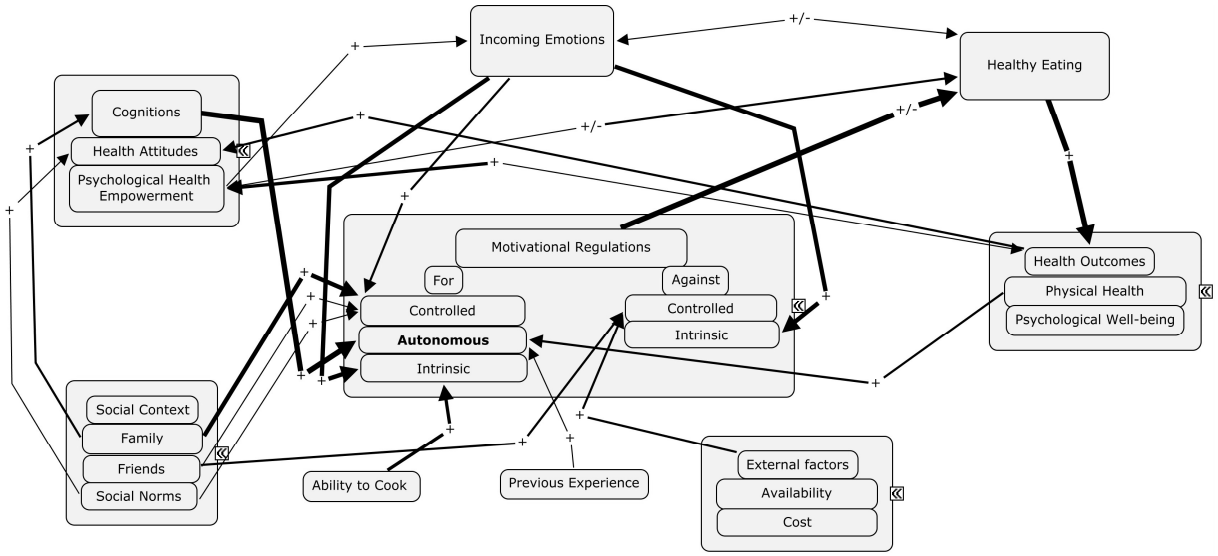


Figure 7-30. A between-case display for healthy eating (n=6). The matching rate between displays ranged 76 to 100% for the concepts and 26 to 92% for the relations among them.